PROVINCE OF BRITISH COLUMBIA

REPORT

OF

THE FOREST BRANCH

OF THE

DEPARTMENT OF LANDS

HON. WILLIAM R. ROSS, K.C., Minister

H. R. MACMILLAN, Chief Forester

FOR THE YEAR ENDING DECEMBER 31ST

1915

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

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Printed by WILLIAM H. CULLIN, Printer to the King's Most Excellent Majesty.
1916.

ERRATA.

In title of right-hand centre picture facing page 32, read "sparseness" instead of "abundance."

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REPORT OF THE FOREST BRANCH,

DEPARTMENT OF LANDS.

December 31st, 1914.

Hon. William R. Ross, K.C.,
Minister of Lands, Victoria, B.C.

SIR,—Four matters made the year 1914 remarkable from the point of view of forest administration in this Province. The first was the passage of the "Timber Royalty Act," which defined, for half a century ahead, the stumpage price of Crown timber; the second was the strenuous and successful struggle with one of the worst fire seasons ever experienced in the West; thirdly, in spite of the unprecedented conditions created by wars and financial depression, the forest revenue was well over $2,000,000; while, fourthly, previous conjectures as to the large amount of timber remaining in the Crown reserve were confirmed by the results of exploration.

The "Timber Royalty Act" attracted widespread attention on account of its bold application of the modern legislative theory which calls for the retention by the State of a due share in the unearned increment upon natural resources. By establishing a sliding scale under which the Government is assured a full proportion of future increases in the selling-price of lumber, the Act made it possible for the Government to give stability of tenure to the lumbermen without injury to the public interest. Financial institutions are now able to accept timber licences as permanent investments. There is no doubt but that the added strength which has been given to British Columbia timber titles by this Act was of great effect during the stress of the past few months in maintaining faith in this the most important class of Provincial security and in enabling investors and manufacturers to meet their obligations.

The fire season was one of the worst in the history of the West, being comparable in most ways with that of 1910. But although there were more fires in 1914 than in any year on record, they resulted in far less damage than has occurred in many previous seasons: a gratifying result to which the efficiency of the patrol and fire-fighting system of the Province undoubtedly contributed. We have only to observe the effect of weather conditions in the American States to the south of us to realize how strenuous conditions were. Over $1,000,000 was expended there upon timbered areas no larger than those of this Province, and yet the cost to British Columbia did not exceed $400,000 for fire-fighting and patrol. Property damage was estimated at about the same amount.

Future forest revenue will depend upon the protection from fire of the young forest now in various stages of maturity on the non-agricultural lands of the Province. This young growth, together with the large quantities of unalienated mature timber, will in a very few years be required for use and become valuable. The present fund available for fire-protection is not sufficient to protect such areas from fire. The direct interest of the public is so great in the protection of these timber lands, some of which will begin producing revenue in a very few years, that as the fire hazard increases in their vicinity it may become necessary to ask that a larger Government contribution be made toward the cost of their protection.

But a portion of the Province has so far been covered by the forest survey of the past three seasons, yet the merchantable timber definitely located in the Crown reserve already reaches a considerable total. The boundaries of no less than 954,970 acres of unalienated statutory timber land have been established on the official maps of the Province, without including any of the areas covered by reconnaissance during the past season. The preliminary reports concerning the latter show that an additional 30,000,000,000 feet of timber were located by our field parties in 1914; and when the full reports have been tabulated the Crown reserve will receive a further most satisfactory increase on account of unalienated timber that is included in this large stand.

The market problem confronting the lumber industry and the Government's efforts to assist in solving it, are dealt with in the following report. The first hint of war temporarily paralysed

building operations in the market supplied from the Pacific Coast. The lumber industry, which was in a weak condition following the inflation of a year ago, was brought to a dead halt. The effects are now felt in every community throughout the Province by every class of the population, for this industry furnished our greatest export product, met the adverse balance of trade in every community, and provided settlers with a market for both their labour and their produce. In the majority of the villages and towns in the Province prosperity will return quickest through revival in the lumber business. There is no lack of timber to cut; there is no lack of mills to cut it. It is the market that must be sought, both in Canada east of the Rockies and in the United States from the Mississippi Valley eastward, in Australia and the Orient, and to a certain extent in Europe. An aggressive campaign for the capture of these markets is now under way in the North-western States, lumber manufacturers and the Federal Government pushing it together. I cannot too strongly urge that the most important duty of the Forest Branch at the present time is to assist in extending the markets for British Columbia's forest products. If the present opportunity is lost the lumber industry of this Province will have a long uphill fight in establishing its position.

"ROYALTY ACT."

In 1888, when the Legislature first dealt in a comprehensive way with the disposal of Crown timber, a royalty of 50 cents per 1,000 feet B.M. was established as the standard figure for stumpage upon all logs cut for sawmilling purposes in the Province. It was not until the timber asset of British Columbia took on a new importance, with the issue of licences covering some 14,000 square miles during the years 1905-6-7, that the question of readjusting the stumpage rate was brought forward. In issuing those timber-cutting licences it was expressly provided that the royalty to be paid when logs were cut was not to be any fixed amount, but was to be subject to increase at the discretion of the Legislature, so that as the commercial value of the timber increased the Provincial Treasury should receive its due proportion of the increment. A proposal to make an immediate increase of 25 cents in the royalty was brought forward soon after this, but the financial depression of 1908 caused the matter to be postponed until the end of 1912, when a revision of the Act was made and submitted to the Legislature at the beginning of the following year. The draft proposal was for certain fixed increases to be made in the royalty during the ensuing period of ten years. This tentative proposal formed a basis for keen discussion, and in the upshot it was decided to postpone legislation for a year. Investigation of the whole subject was carried on until in February last the result was embodied in the "Timber Royalty Act."

Since under the system of timber licences the Crown and the licensees share between them the stumpage value of the timber held, the main object of the Act was to define the terms of the partnership. As security of tenure was essential for the development of the lumbering business, it was necessary to provide for a long term of years. Future changes in stumpage values, however, can only be guessed. Hence a sliding scale had to be devised in order that the stumpage obtained by the Government in time to come might reflect any change in timber values, up or down.

Since these values are the difference between selling-price and cost of manufacture an exact determination of royalty could only be made after a complete audit of the books of every operating concern. As a practical matter the sliding scale had to be based on some simpler method than this, and accordingly the average selling-price of lumber was taken as the barometer of stumpage value. A certain initial increase, to take effect at the year's end, was made in the existing royalty; no further increase was to be made until the selling-price of lumber had passed the $18 level; and the future was provided for by enacting that the stumpage payable to the Crown at any future date should be the 1915 royalty plus a certain percentage of the increase in the average selling-price of lumber over $18.

This "Timber Royalty Act" attracted a great deal of attention in other countries, and was much discussed in the press as an important example of advanced legislation. A summary of its provisions is as follows:—

1915-19: Royalty, 85 cents and 50 cents on grade, for Coast districts; 50 cents on British Columbia rule for Southern Interior; 65 cents for Northern Interior.

1920-24: Royalty increased by not more than 25 per cent. of any increase over $18 in average selling-price of lumber.

1925-29: 30 per cent. of increase over $18.
1930-34: 30 per cent. of increase over $18.
1935-39: 35 per cent. of increase over $18.
1940-44: 35 per cent. of increase over $18.
1945-49: 40 per cent. of increase over $18.
1950-55: 40 per cent. of increase over $18.

In order to obtain the necessary data upon which this sliding scale will be based, the average wholesale selling-price of lumber in the Province must be ascertained each year.

ORGANIZATION.

DISTRIBUTION OF TOTAL FORCE, BRITISH COLUMBIA FOREST BRANCH, 1914.

Forest District.	Permanent.									Temporary.						Grand Total.
	Chief Forester and Assistant Foresters.	District Foresters.	Deputy District Foresters.	Office Clerks and Draughtsmen, etc.	Forest Assistants.	Scalers.	Cruisers.	Rangers.	Launch Crews.	Guards (Fire Wardens).	Patrolmen and Special Patrolmen.	Packers and Camp-men.	Assistant-men.	Railway Patrolmen.	Rangers, Assistants, Campsmen, etc.	
Cranbrook		1		1	1	1		3		33	12	1	2		1	44
Fort George		1		1	1			5		28		7		16		60
Hazelton		1		1	1			4		23	1	4				35
Island		1		1		2		3	2	18	5			3		35
Kamloops		1		1		1		3		11	7			4	1	29
Lillooet		1		1	1			2		10	3			9		25
Nelson		1		1		1		4		22	42		1		1	73
Prince Rupert		1		1					4	11						20
Tete Jaune		1		1						7				7		16
Vancouver		1	1	7		13		3	7	27	9			4	4	78
Vernon		1		1				2		12	35		2	6	1	60
Victoria Headquarters	3			28	15		7		3						15	83
Totals	3	11	1	55	20	18	7	34	16	199	112	12	5	49	23	558

AREAS OF ADMINISTRATIVE AND PROTECTIVE UNITS, 1914.

Forest District.	Total Land Area.	No. of Ranger Districts.	Average Area, Ranger Districts.	No. of Regular Guard Districts.	Average Area, Guard Districts.	Maximum No. Guards and Patrolmen during Season.	Average Minimum Area, Guard and Patrolmen Districts.
Cranbrook	7,980,000	3	2,660,000	21	380,000	30	252,000
Fort George	36,850,000	5	7,330,000	29	1,233,793	31	1,182,258
Hazelton	23,120,000	4	5,620,000	23	1,004,348	24	962,500
Island	6,390,000	3	2,130,000	19	336,314	21	304,286
Kamloops	6,970,000	3	2,325,000	11	633,636	22	316,818
Lillooet	12,670,000	2	6,335,000	10	1,267,000	11	1,151,818
Nelson	7,960,000	4	1,987,500	22	361,363	66	124,219
Prince Rupert	21,380,000	3	7,126,000	11	1,989,091	11	1,989,091
Tete Jaune	5,225,000	1	5,225,000	9	580,561	9	580,561
Vancouver	15,770,000	5	3,154,000	24	657,083	33	477,878
Vernon	5,835,000	2	2,915,000	12	486,625	46	126,948
Totals, 1914	150,000,000	35	4,285,714	191	785,478	302	496,000
Totals, 1913	150,000,000	34	4,545,454	160	943,396	224	669,464

The work of bringing together and training a force to carry out the duties placed upon the Branch by the "Forest Act" has now passed the first preliminary stage. The groundwork of the organization is complete, and a field force has been developed which is capable of attending to all the most pressing lines of work. Attention was first, most properly, devoted to putting revenue collection on a substantial business basis and to systematic fire-prevention; although

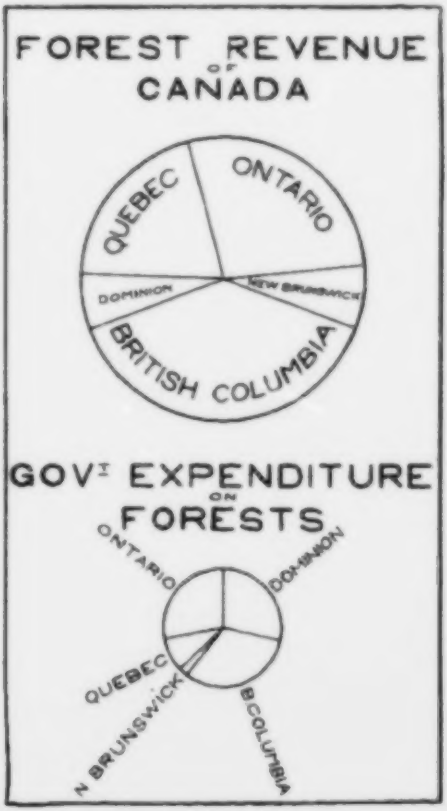
a beginning has been made at other work, such as a survey of the forest resources of the Province, a study of the methods necessary to ensure the highest productivity of forest land, and an investigation of wider markets for forest products. The Branch is therefore now entering upon the second stage of development, and can now devote itself henceforth to the study of ways and means to increase the output and use of forest products. This programme will be energetically carried out.

The tables presented above give the permanent and temporary force employed during 1914, with the areas of the guard and patrol districts. No change was made in the number of forest districts, although minor adjustments of the boundaries were found to be necessary.

On account of the large amount of business transacted in the Vancouver District, it was necessary to give the District Forester there more assistance, and the position of Deputy District Forester was created.

The great increase in field-work this year made a corresponding increase in office-work. The large number of fires, especially in the southern districts, entailed a great amount of correspondence and other office-work. During the fire season the office staff as well as the field staff was working overtime. In order to cope with this office-work, and at the same time allow the District Foresters to be in the field, where it is their business to be, it was necessary to make a small increase in the office staff, fifty-four persons being thus employed, as against forty-three in 1913.

The number of Forest Assistants, Cruisers, Rangers, and Scalers remains practically unchanged from last year. In the temporary force there was a great increase over 1913, the number of guard districts being increased by thirty. Most of this increase was in the northern districts, where the opening-up of the country by railways has caused a large influx of people. Besides this increase in the number of Guards, there was necessary a much greater increase in the number of patrolmen, hired by the month or day during midsummer, when hazard is greatest, to supplement the regular force. Altogether the temporary force, including Guards, patrolmen, canoemen, packers, and lookout men (but not Railway Patrolmen, who are a special class patrolling only the railway right-of-ways), at the height of the fire season in 1914 numbered 723, an increase of 10 over the 284 of 1913. The fact that the Forest Branch was able to employ a larger force during the most dangerous part of the year undoubtedly is one of the chief reasons why the fire-damage was so small.



The effects of the war have been felt in this Branch as elsewhere. Both the field and office staffs have been reduced through enlistment, seventeen of the permanent force and a considerable number of Guards and Patrolmen having so far undertaken military service.

FOREST REVENUE.

Severe depression existed in the lumber business in the earlier part of the year under review, and, coming on top of this, the outbreak of war in August made the conditions for the collection of revenue during the autumn unfavourable. Under the circumstances, the collection of $2,157,019 for the twelve months ending November 30th is satisfactory.

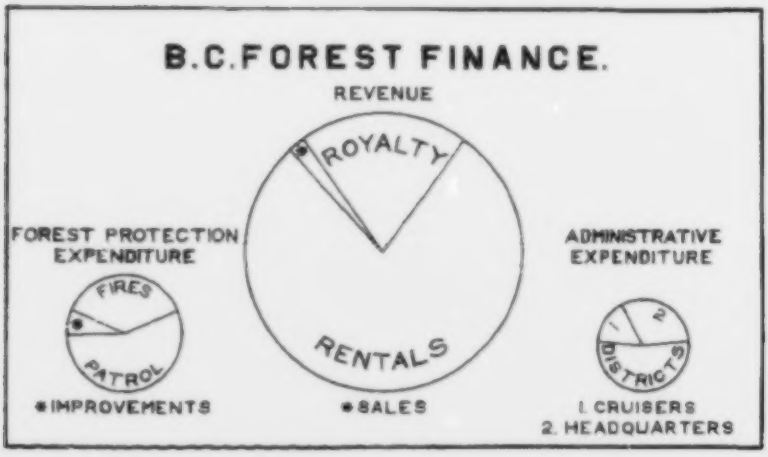
In the previous year the amount passed through the books included about $370,000 that had accumulated in the Trust Deposit Account

from previous years, and, allowing for this, the net decrease in collections due to the unprecedented financial conditions in 1914 is the comparatively small amount of $325,770.

Revenue taken to account during the fiscal year ending March 30th, 1914, amounted to $2,612,980. Taking the taxation of private timber lands into account, the total Provincial revenue from forest sources was $2,698,561.

STATEMENT OF FOREST REVENUE.

	12 Months to December, 1914.	12 Months to December, 1913.
Timber-licence rentals	$1,555,980 28	$2,112,876 18
Royalty and tax	391,118 30	482,707 05
Trespass penalties	7,170 95	9,016 95
Lease rentals	88,702 08	119,291 44
Scaling fees	30,472 32	23,978 90
Scaling expenses	1,805 82	1,759 41
Seizure expenses	270 90	...
Licence penalties	25,335 00	24,291 00
Timber stumpage	36,545 33	18,719 92
Transfer fees	7,085 00	10,385 00
Hand-loggers' licence fees	5,200 00	5,025 00
Interest	115 13	17,208 84
Timber-mark fees	508 50	924 50
Timber-sales rentals	3,477 87	2,597 95
" cruising	1,550 83	1,140 40
" advertising	334 05	691 10
Scalers' examination fees	425 00	585 00
Copies of documents	569 57	...
Exchange	61 90	119 95
General miscellaneous	...	1,469 73
	$2,157,018 95	$2,882,788 71
Taxation from Crown-grant timber lands	$185,661 00	$166,540 00
Total revenue from forest sources	$2,342,679 95	$2,999,328 71



DISTRICT REVENUE FROM LOGGING OPERATIONS.

District.	AMOUNT CHARGED.						
	Royalty and Tax.	Scaling Fees.	Trespass Penalties.	Seizure Expenses.	Scaling Expenses.	Stumpage.	Totals.
Nelson	$ 31,509	...	$1,830	$ 10	...	$ 322	$ 33,671
Vernon	15,994	...	549	...	$ 304	16	16,863
Kamloops	8,161	$ 81	166	...	67	16	8,491
Prince Rupert	7,541	352	389	...	42	439	8,763
Hazelton	3,262	...	218	...	...	2,422	5,902
Lillooet	2,384	9	779	...	63	465	3,700
Fort George	13,521	...	4,823	377	...	4,804	23,525
Tete Jaune Cache	1,888	...	608	...	...	12,961	15,457
Cranbrook	86,700	43	...	...	40	8,423	95,206
Vancouver	220,094	25,396	3,529	478	1,354	30,187	281,038
Island	36,547	4,186	...	...	402	...	41,135
Totals	$427,601	$30,067	$12,891	$865	$2,272	$60,055	$533,751

SPECIAL LICENCES.

Number, December 1st, 1914.—Number renewable while timber remains, 12,429; number renewable for fixed period only, 1,255; total, 13,684.

Expiries.—Average expiries in 1913 were 14 per month; average expiries in 1914 were 29 per month. As it happens, the number of expiries has decreased somewhat during the last half-year.

Surveys.—The number surveyed in 1913 was 1,879; the number surveyed in 1914 was 2,054. There remain 6,019 licences still unsurveyed.

Transfers.—Change of ownership was registered in 2,035 cases in 1913; change of ownership was registered in 1,417 cases in 1914.

Location of Licences.

Forest District.	No. of Licences.
Cranbrook	905
Hazelton	560
Kamloops	1,059
Lillooet	53
Nelson	1,300
Prince Rupert	1,244
Fort George	962
Tete Jaune Cache	1,001
Vernon	325
Vancouver	3,327
Vancouver Island	2,348
Total	13,684
Total	13,684
East of Cascades	6,919
West of Cascades	6,665

ROYALTY.

Last year, in spite of the depression, I was able to report a slight increase in the collections of timber royalty over 1912. In the past twelve months, the general financial condition and the war resulted in the collection of $467,380 as royalty, stumpage, etc., from operations, as against $536,179 for 1913.

ESTIMATED DISTRICT REVENUES, 1914.

Cranbrook	$ 187,544
Fort George	121,819
Hazelton	70,760
Kamloops	179,896
Lillooet	10,253
Nelson	167,461
Prince Rupert	169,042
Tete Jaune Cache	117,513
Vancouver Island	362,777
Vancouver	720,933
Vernon	49,002
Total	$2,157,000

CROWN-GRANT TIMBER LANDS.

Year.	Area of Private Timber Lands.	Average Value per Acre.
	Acres.	
1911	824,814	$8 72
1912	874,715	8 60
1913	922,948	9 02
1914	960,464	9 66

The extent and value of timber land in the various assessment districts* are shown by the following table:—

District.	Acreage, 1914.	Increase or Decrease in Acreage over 1913.	Average Value per Acre.	Change in Value per Acre since 1913.
Victoria	17,920	+ 579	$12 84	—0.46
Cowichan	107,261	+38,152	13 88	—1.00
Alberni	44,718	— 15	18 59	+3.14
Nanaimo	77,463	— 6,736	13 06	+2.01
Comox	216,634	— 2,709	14 11	+1.57
Rossland	28,704	— 681	4 26	—0.24
Kettle River	6,041	No change	3 00	No change
Slocan	47,368	+15,600	5 28	—2.58
Kamloops	...	— 4,960	...	...
Vancouver	7,428	No change	15 72	+0.69
Nelson	182,013	— 360	3 75	—0.07
Vernon	6,473	+ 1,781	3 89	+0.83
Golden	77,974	+ 27	3 86	+0.01
Revelstoke	48,599	+ 1	11 43	—0.04
Fort Steele	91,868	— 3,163	6 43	+0.02
Totals	960,464	+37,516	$ 9 66	+0.64

* It should be noted that these are different from the forest districts.

EXPENDITURE.

In addition to the Government's contribution of $166,000 to the Forest Protection Fund, the sums voted for forest-work during 1914 were:—

Vote 10—Salaries	$202,636
„ 290—Miscellaneous	129,700
„ 292—Exhibits, export lumber trade	15,000
„ 293—"Royalty Act"	7,500
„ 294—Forest products investigations	10,000
„ 295—Vancouver Exhibition	3,000
Total	$367,836

Of this amount, about $28,000 is refunded to the Treasury by the collection of scaling fees. Retrenchment carried out in view of prevailing conditions will, it is estimated, result in an economy of 30 per cent. of this total.

GENERAL ADMINISTRATIVE EXPENDITURE.*

(Fiscal Year ending March 31st, 1915.)

Headquarters	$ 85,828
Field staff	22,308
Launches	10,877
Cranbrook	9,834
Fort George	12,300
Hazelton	7,689
Island	8,977
Kamloops	8,841
Lillooet	5,734
Nelson	9,034
Prince Rupert	11,834
Tete Jaune Cache	4,706
Vancouver	49,498
Vernon	6,944
Total	$274,204

* Expenditure for last four months of fiscal year being estimated.

As the accounting system was organized for the most part in 1913, there is comparatively little change to comment on except its gradual extension. During the past twelve months a cost system has been installed in order that expenditure may be closely analysed. Launch expenditure, for instance, shows cost per mile of engine fuel and supplies, and similar matters.

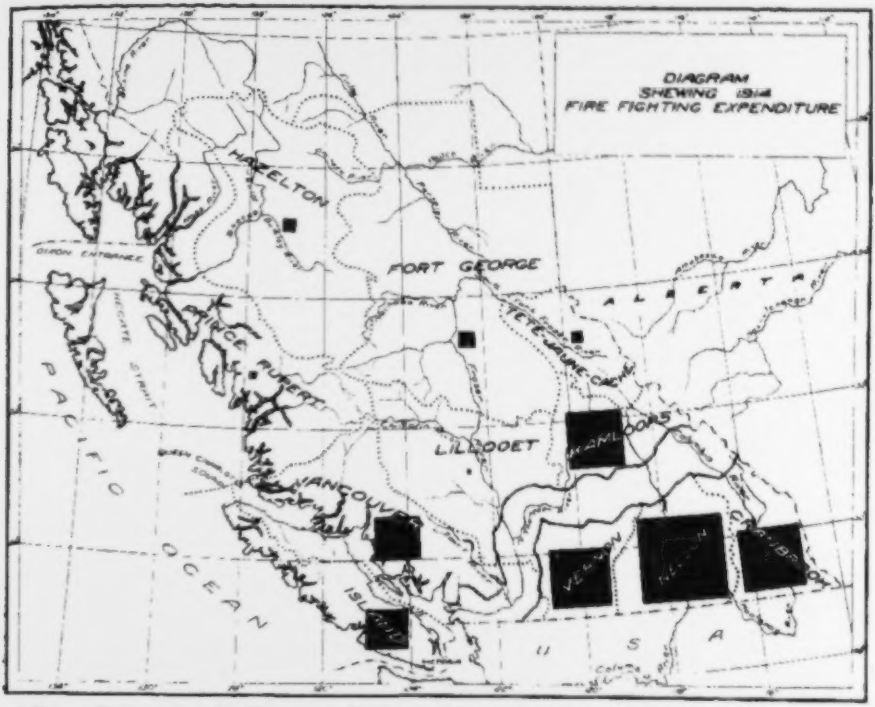
FOREST PROTECTION FUND.

At April there was remaining from the previous fiscal year a credit balance of $26,856. The Government vote for the year was $165,000, while from licences (8,460,000,000 acres), leases (945,000 acres), and private timber lands (1,669,196 acres) there was due an equal amount; and the total fund available for the year was thus estimated at $359,082. The plans for the season allotted the surplus from the previous year for improvements, and $232,000 for patrol, leaving a balance of approximately $100,000 available for fighting fires. The unusually heavy cost of fire-fighting caused by the severe season experienced will cause a deficit of $21,000 on the year.

Total Expenditure.

	1913.	1914.
Patrol	$205,000	$223,239
Improvements	104,000	27,505
Fires	9,000	144,014
Totals	$318,000	$394,758

It should be noted that about $18,000 of this total for 1914 has been expended on behalf of railway companies, and will be refunded.



* NOTE.—Black square for Vancouver Island expenditure represents $11,695, the other squares being drawn to same scale to represent expenditure in other districts. (Refer to statement of costs below.)

Forest Protection Fund, 1914.

	Patrol.	Improvements.	Fires.	Total.
Headquarters	$ 8,370	...	...	$ 8,370
Cranbrook	18,720	$1,375	$25,194	45,289
Fort George	37,615	421	1,717	39,753
Hazelton	19,945	1,528	1,113	22,586
Island	17,317	3,880	11,005	32,202
Kamloops	14,566	6,582	21,113	42,261
Lillooet	13,173	...	123	13,296
Nelson	23,895	2,246	48,970	75,111
Prince Rupert	10,989	...	427	11,416
Tete Jaune	8,230	...	983	9,213
Vancouver	32,424	9,845	10,007	52,276
Vernon	18,065	1,628	23,362	43,055
Totals	$223,309	$ 27,505	$144,014	$394,828
1913	205,000	104,000	9,000	318,000

Monthly Patrol Expenditure, 1914.

	April.	May.	June.	July.	August.	Sept.-Oct.
Headquarters	$1,920	$1,640	$1,679	$1,237	$1,062	$ 834
Cranbrook	170	2,809	3,352	4,294	4,750	3,345
Fort George	1,132	6,869	7,902	8,370	7,336	5,996
Hazelton	1,282	3,640	5,068	3,965	3,651	2,333
Island	390	3,084	3,573	3,429	3,575	3,068
Kamloops	690	2,149	2,699	2,985	3,448	2,820
Lillooet	596	2,179	2,375	3,027	2,965	2,091
Nelson	680	3,415	3,418	4,419	6,922	5,042
Prince Rupert	480	1,976	2,507	2,381	2,391	1,245
Tete Jaune	207	1,486	1,452	1,495	1,726	1,550
Vancouver	1,070	6,352	6,561	6,697	6,644	5,150
Vernon	559	2,453	2,871	3,596	4,859	3,727
Totals	$9,316	$38,052	$43,457	$45,875	$49,338	$37,201

STATUS.

The Status Office is responsible for the investigation of the numerous questions of land title which are involved in so much of the work carried on by the Branch. There are in this Province many different forms of land alienation, each subject to different conditions. Every field examination, timber-sale, permit, logging report, application for a timber-mark, and scale and royalty account must be analysed, and this means constant and careful search of maps and records.

STATUTORY TIMBER LAND.

From the reports of reconnaissance parties and District Foresters must be extracted all information concerning areas of merchantable Crown timber, in order that these may be marked upon the official reference maps of the Province, and so protected from alienation. No less than fifty-one reports have been so dealt with during the past few months; and from these the following areas of merchantable timber have been entered upon the maps and placed in the reserve of merchantable timber held by the Crown:—

Forest District.	Crown Timber Reserved. Acres.
Cranbrook	2,097
Fort George	41,250
Hazelton	251,888
Island	100
Kamloops	162,464
Lillooet	126,200
Nelson	22,664
Prince Rupert	21,500
Tete Jaune Cache	141,190
Vancouver	131,560
Vernon	53,955
Total	954,950

That nearly a million acres of merchantable timber should have thus been located and placed in the Crown reserve confirms the conviction held by Foresters that the quantity of merchantable timber in the Province is far larger than was at one time supposed. The asset represented by the areas above mentioned amounts to several million dollars. As only a portion of British Columbia has so far been covered by our cruisers, the continuance of the forest reconnaissance will obviously result in further discoveries.

TIMBER-MARKS.

The present system of marking timber has now been in operation for over a year, and, judging by the scale and royalty accounts and logging reports, it appears to be working well. The advantage of the system lies in the ease with which the class of land from which the timber was cut, and the royalty due to the Provincial Government, can be ascertained by a

glance at the stump carried on any particular log. The distinction between exportable and non-exportable timber is also shown. Four hundred and sixteen marks were issued during the past twelve months, while 143 transfers were made where the mark-holder applied for an extension of his mark to cover fresh ground. This makes a total of 1,120 marks effective at the present time.

The following table shows the number of marks issued under the different classes:—

On old Crown grants	74
On Crown grants, 1887-1906, exportable	143
On Crown grants, 1906-14, non-exportable	208
On timber falling under the "Royalty Act, 1914"	188
On leases	39
On sixteen-year leases	3
On timber-sales	65
On hand-loggers' operations	377
On timber reserves and Dominion timber	23
Total	1,120

The timber-mark List, the first issue of which was printed at the end of last year, has proved its value by the ease with which logging reports and scale and royalty accounts can now be checked, and in its constant use by the various Forest Branch officials during their inspection of logging operations in the field. This list, which is under constant revision, is published every month, and contains a complete record of all the lands in the Province covered by a timber-mark on which logging operations are carried on. It enables one to tell at a glance the owner of any marked log and the land from which the timber was cut. It is kept up to date by checking off dead material at frequent intervals.

HAND-LOGGER LICENCES.

As delay in dealing with applications for these licences creates hardship to small operators, every effort is made to handle them with dispatch. They are now mailed invariably within three days of the receipt of the applications. The number of these licences issued in past twelve months is 224. Last year there were 201, and the year before 165. The making of small timber-sales will, it is anticipated, reduce the number of licences of this character required.

FOREST ATLAS.

To secure necessary accuracy, constant and careful search of maps and records is inevitable. Here again it is possible to reduce labour and save delay. The compilation of a "ready reference" to all land titles—extracts from the registers of the Lands Department—will save many hours of routine work each week. This is being pushed forward as fast as circumstances permit, but is a laborious undertaking, and will take some time to complete.

The Forest Atlas, on the other hand, has been in working for a long time past, and has proved an invaluable short cut to efficiency. The atlas shows at a glance the complete record of field-work in each district, the results of that work, and the status of forest lands. The number of land examinations entered in the atlas so far is 1,459, made up as follows:—

Forest District.	Examinations entered.
Cranbrook	137
Fort George	33
Hazelton	64
Island	272
Kamloops	11
Lillooet	10
Nelson	40
Prince Rupert	73
Tete Jaune Cache	...
Vancouver	792
Vernon	27
Total	1,459

The 400 maps which compose the atlas deal with timber-sales, reconnaissance reports, railway permits, logging reports, ranger stations, mill-sites, logging-roads, booming-grounds, and hand-logger licences. The main function of the atlas is to prevent duplication of field-work.

CORRESPONDENCE.

In this third year of the Branch's existence there has been a considerable increase in the volume of general business in spite of the war and the general financial depression. Incoming mail, for instance, increased 25 per cent. and outgoing 40 per cent. as compared with the previous year, the total number of letters being 26,000 inward and 43,000 outward. For book-keeping purposes mail for the Accounting section of the office is handled by letter-book entry; but to economize labour and speed up the office machinery all other mail is dealt with under a "subject" filing system, which does away with book entries and attendant delay.

FOREST RECONNAISSANCE.

The survey of the forest resources of the Province, commenced in 1912, was continued during 1914, but on account of the great need of funds for administrative work fewer parties were engaged on this work than in previous years. Besides the work done by the regular reconnaissance parties, however, reports on many areas were obtained from Forest Assistants, Rangers, and Forest Guards, a number of whom were able to make satisfactory surveys of territory into which their other duties took them.

Altogether 12,000,000 acres were reported upon, and, as was expected, considerable bodies of valuable timber were discovered. At the time of writing this report the results of the year's work have not yet been tabulated and placed upon the records, and only a preliminary estimate can be made. Roughly speaking, some 5,000,000 acres of statutory timber land were located, carrying a stand of 30,000,000,000 feet of merchantable forest. Undoubtedly a considerable proportion of this will be found to be in the Crown reserve of unalienated timber. While most of this timber will not come into the market for many years, it will be logged in time, and will eventually yield a large revenue to the Province, besides providing material for an extensive lumbering and sawmilling industry, which will be a strong influence in promoting agricultural development. It forms a reserve of timber capital which, provided we protect it from destruction by fire, can be drawn upon any time in the future.

While the reports of the fieldmen have not yet been completed, the following rough summary of the reconnaissance work of last summer may be given:—

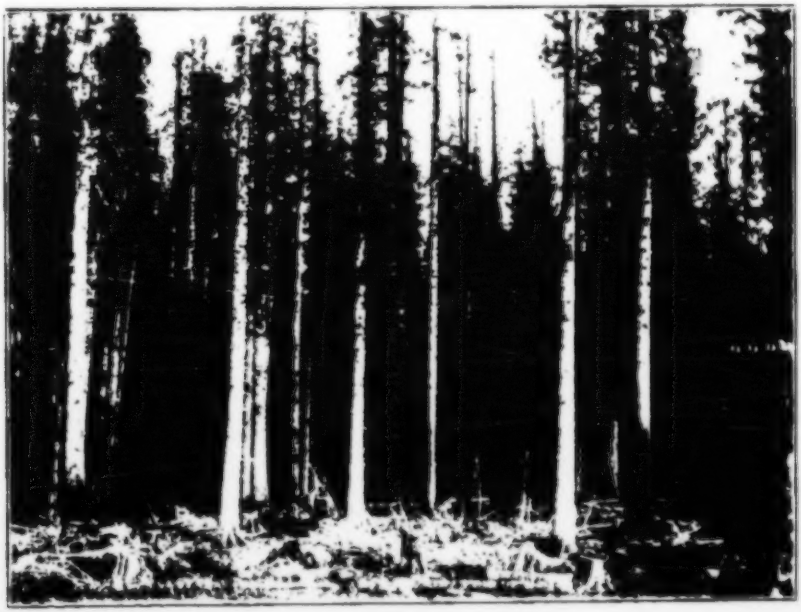
BABINE LAKE.

An area of 1,691,000 acres on Babine and Stuart Lakes, showing the following classification of cover:—

	Acres.
Merchantable timber	905,000
Burned-over and second-growth lands	732,000
Barren areas and unmerchantable scrub timber	148,000
Open meadows	6,000
Total	1,791,000

The 905,000 acres of merchantable timber bear a total stand of 5,470,000,000 feet B.M. of spruce, Douglas fir, lodge-pole pine, and balsam. The Douglas fir is confined to the slopes of Stuart Lake, this locality being near the extreme northern limit of this valuable species. Of the 732,000 acres classified as burned over and second growth, 358,000 acres is covered with a young stand of timber which is even now suitable for pulp-wood, and if protected from fire will in twenty-five to fifty years yield saw-timber. Of the area examined 432,000 acres is reported as of agricultural value, the land when cleared being suitable for hay and hardy root-crops, so that dairying could be carried on successfully.

A Forest Branch cabin, Columbia Valley, Kamloops District. A telephone is installed here connected with the Forest Branch telephone line, Revelstoke to Big Bend, a distance of 120 miles.



Dense stand of cedar on line of Grand Trunk Pacific near McBride, to be sold by Forest Branch.

WILLOW AND BOWRON (BEAR) RIVER.

One million one hundred and ninety thousand acres on the headwaters of the Willow and Bowron Rivers, near Barkerville, were examined and mapped during 1914. The forest cover on this area was classified as follows:—

	Acres.
Merchantable timber	1,095,000
Burned over and second growth	95,000
Total	1,190,000

The merchantable timber is estimated at 8,000,000,000 feet B.M., over half of which is spruce, the remainder consisting of balsam fir, lodge-pole pine, Douglas fir, and hemlock. A very small amount of cedar was also found. The region covered is rolling or mountainous and is valuable chiefly for the production of timber, about 15,000 acres being fitted for agriculture.

PINE RIVER PASS.

Three million four hundred and sixty thousand acres along the proposed route of the Pacific Great Eastern Railway from the mouth of the Misinchinka River, through Pine River Pass and down the South Pine River to the Dominion Peace River Block, were covered by rough reconnaissance during the past season, and merchantable timber in surprising quantity and quality was discovered. The forest cover was classified as follows:—

	Acres.
Merchantable timber over 5,000 feet per acre	1,138,000
Non-merchantable timber under 5,000 feet per acre	410,000
Burned over and second growth	1,232,000
Barren areas, swamps, and muskegs	680,000
Total	3,460,000

The region is mountainous, including as it does the main range of the Rocky Mountains, but on the east side the mountains give way to the Peace River plateau, and there, and also along some of the larger rivers, about 200,000 acres of the land examined are reported to possess agricultural possibilities. The territory is undoubtedly capable of producing timber of good quality in great quantity. At the present time the area classified as merchantable timber carries over 7,000,000,000 feet of good spruce and balsam fir. The immense area of burned-over land, 1,200,000 acres, indicates the great need for fire-protection in this district, since had fire not run over it, this land, judging from the unburned areas, would bear an additional stand of 7,000,000,000 feet of merchantable timber.

UPPER PARSNIP RIVER.

One of the largest unbroken bodies of merchantable timber in the Province was discovered last season on Parsnip River above the mouth of the Misinchinka River. This tract, containing over 1,000,000 acres, bears a stand of excellent spruce and balsam. The stand is estimated at 6,000,000,000 feet B.M. The logging conditions are favourable and the Parsnip River is easily drivable, so that in time large logging operations will be established in this district. In the meantime this immensely valuable tract of timber must be protected from fire. No agricultural land has been reported in this area.

CARIBOO.

The reconnaissance of the Lillooet and Cariboo Districts, commenced last year, was continued, and the entire territory between the Fraser River and the North Thompson and Clearwater Rivers has now been covered. The southern and western portions of this district is a rolling plateau. Being within the Dry Belt, it is lightly timbered as compared with other sections of the Province, but the stand of timber will furnish millions of railway-ties and much sawtimber, and eventually nearly all of it will be sought for pulp-wood. Agricultural land is confined to the valleys and a few river benches. Around the many alkali lakes and on south slopes the timber is sparse or lacking, and here good forage is found. From 150-Mile House (on the Cariboo Road) north and eastward the timber is denser, and where fire has not destroyed the growth the timber is of good size and fair quality. In the Cariboo Range the rainfall is heavier

and cedar and hemlock are present in the stand. Generally, however, Douglas fir, lodge-pole pine, and spruce are the most important species.

The forests of this region have suffered most severely from fire, the present stand being only a fraction of what it should be. The data for the area examined this season have not yet been compiled, but a preliminary estimate places the area of merchantable timber land at over 1,000,000 acres and the stand at over 5,000,000,000 feet B.M.

WEST SLOPE OF CASCADE RANGE.

A reconnaissance of the west slope of the Cascade Range from the Railway Belt to Cape Caution was commenced in 1914, and, while the work was interrupted, a start was made in collecting information in regard to the timber stands in this rugged region. The area examined included that portion of the Lillooet River drainage system lying between Harrison Lake and Pemberton Meadows, the whole of the Toba River watershed, and the lower portion of the Homathko and Klinaklini watersheds. The data for the Lillooet River area have not yet been compiled. Those for the Toba, Homathko, and Klinaklini Rivers show the following classification of the cover:—

	Acres.
Merchantable timber land	81,564
Non-merchantable timber land	41,363
Burned over timber land	2,655
Alder and cottonwood bottom land	20,019
Gravel-bars	17,492
Meadows and swamps	527
Water-surface	2,196
Total	165,816

The total stand of merchantable timber on this area is 1,400,000,000 feet B.M., of which 200,000,000 feet are on vacant Crown lands. The timber is that typical of the Coast Douglas fir type, averaging about 17,000 feet per acre. While the alder and cottonwood bottoms may be classified as agricultural lands, they are subject to occasional overflow. Some of the heavily timbered lands possess good soil and can be opened to settlement after the timber is removed.

LUMBERING INDUSTRY.

From the earliest days the pioneer industry of British Columbia has been the manufacture of forest products. Of all the resources with which the Province is endowed, the forest, because of its quantity, high quality, varied usefulness, and accessibility to many waterways and transportation routes, has been the resource from which the population of most districts first sought their livelihood. The fact that agricultural development in many sections of the Province has waited upon the market for labour and for produce provided by the lumber industry has done much to make our forest industries prominent.

A Province so noted for its forests has naturally attracted workers and investors who have received their training in other forest regions, and who are eager to take part in the development of the last important stand of commercial timber in Canada. It is not surprising, with these considerations in mind, to find that British Columbia led all the Provinces in Canada in lumber production in 1913, and that the manufacture of forest products was the Province's most important source of wealth.

The report issued by the Dominion Forest Branch for 1913 shows Canada's production of lumber to have been as follows:—

TOTAL LUMBER CUT, 1913, BY PROVINCES.

Province.	M. Ft. B.M.
British Columbia	1,173,647
Ontario	1,101,066
Quebec	630,348
New Brunswick	399,247
Nova Scotia	247,722
Saskatchewan	114,800
Manitoba	71,961
Alberta	44,462
Prince Edward Island	6,391

The prime importance of the forest industries of this Province is seldom realized, for they have become so much a part of our daily life that they are taken for granted. The volume and value of manufactures for the calendar year 1913 is shown below:—

Coast lumber, 1,200,000,000 feet B.M.	$20,400,000
Interior lumber, 400,000,000 feet B.M.	6,400,000
Pulp products	3,000,000
Construction material (cut by railroads, mines, settlers, hewn ties, cordwood), 100,000,000 feet B.M.	1,000,000
Further value contributed by wood-using industries, box-factories, planing-mills, sash and door factories, cooperage, wood-block paving, wood pipes, slab fuel	1,000,000
Shingles from bolts	550,000
Poles and piles, 5,000,000 lineal feet	400,000
Product of Dominion lands	450,000
Mining props and posts	250,000
Lath	200,000
	$33,650,000

During the year 1913 this large amount was distributed within the Province, about $13,440,000 going to transportation companies, $11,760,000 to labour directly employed in the industry, $5,040,000 to merchants for equipment and supplies, and $3,360,000 for taxes, insurance, and interest on capital invested.

The lumber industry in 1913 ranked above the other basic wealth-producing industries.

Forest products	$33,650,000
Mining	30,206,398
Agriculture	25,974,520
Fisheries	14,455,488

Of these industries, mining and fisheries are confined to certain favoured portions of the Province. The other two, lumbering and agriculture, are found to contribute to the support of every community. When the logging camps and mills are running at full capacity and agricultural settlement and production are being encouraged thereby, no community in the Province, great or small, fails to feel the impetus.

The distribution of lumber-manufacturing plants throughout the Province is as follows:—

Saw and Shingle Mills of Province.

District.	Sawmills.			Shingle-mills.	Total.
	Up to 15 M. Feet Daily Capacity.	15 to 40 M. Feet Daily Capacity.	Over 40 M. Feet Daily Capacity.		
Cranbrook	22	18	6	...	46
Fort George	14	2	...	...	16
Hazelton	12	...	...	...	12
Kamloops	15	4	1	...	20
Lillooet	19	2	...	...	21
Nelson	20	6	6	5	37
Tete Jaune Cache	...	...	1	...	1
Vernon	23	5	1	...	29
Totals, East of Cascades	125	37	15	5	182
Island	20	18	12	12	62
Vancouver	24	35	30	63	152
Prince Rupert	11	6	1	1	19
Totals, West of Cascades	55	59	43	76	233
Totals in Province	180	96	58	81	415

The life of the lumber industry is the export trade. The population of the Province, which in 1912 and 1913 used one-fifth of the lumber used in the Province, does not now use one-twentieth. Thus the market for British Columbia forest products must be found almost wholly outside the borders of the Province.

The policy of the Government for over a quarter of a century has been to restrict the export of unmanufactured products in order that a manufacturing industry based upon our large supplies of raw material might be built up. Thus the export of logs is restricted to timber cut from lands Crown-granted prior to 1906. Export is rigidly supervised by an export patrol and by co-operative arrangement with the Dominion Customs authorities. Two seizures were made during 1914, for attempted export of improperly marked logs, while another case of attempted export in defiance of the Provincial Statute was frustrated by the inability of the exporter to secure clearance.

To minimize the effects of the trade depression due to the war it was found advisable on a temporary measure to allow export of logs from any lands upon the following rates:—

	Grade 1.	Grade 2.	Grade 3.
Cedar	$2 00	$1 50	$1 00
Fir	50	50	50
Spruce	2 00	1 50	1 00
Pine	2 00	1 50	1 00
Hemlock	50	50	50
Balsam and larch	50	50	50

During 1914, 163 permits to export logs were issued, the total amount exported being 65,678,054 feet, which compares with previous years as follows:—

1911	47,000,000
1912	62,280,375
1913	58,752,678
1914	65,678,054

The quantity of each species was:—

	Feet B.M.
Cedar	41,000,300
Fir	9,916,180
Spruce	7,733,035
Hemlock	2,683,388
Pine	3,590,325
Balsam fir	25,589
Cottonwood	60,237

All logs exported during 1914 were graded, the quantity of each grade for each species being:—

EXPORT OF LOGS, SHOWING SPECIES AND GRADES.

Species.	Exportable on Payment of Export Tax.			Exported at Ordinary Royalty, 50 Cents, Ungraded.	Totals.
	Grade No. 1.	Grade No. 2.	Grade No. 3.		
	Feet B.M.	Feet B.M.	Feet B.M.	Feet B.M.	Feet B.M.
Cedar	3,253,221	12,159,637	12,328,498	13,918,944	41,660,300
Fir	206,738	911,506	374,572	8,263,274	9,916,180
Spruce	314,629	1,049,174	688,557	5,080,605	7,733,035
Hemlock	...	35,723	62,697	2,584,968	2,683,388
Pine	41,549	387,802	256,865	2,813,009	3,590,225
Balsam fir	...	6,055	3,464	16,070	25,589
Cottonwood	...	...	...	60,237	60,237
Totals	3,876,147	15,150,087	13,814,653	32,837,107	65,678,054

Other products exported in an unsawn state are poles, posts, props, and hewn or slabbed ties. About 3,000,000 lineal feet of poles and piles were shipped from British Columbia in 1914: 1,836,000 lineal feet from Cranbrook and Nelson Forest Districts to the Prairies, Ontario, and the Central States; 1,133,810 lineal feet from Prince Rupert, Vancouver, and Island Forest Districts to California. An important industry in Cranbrook and Nelson Forest Districts is the shipping of posts, props, and ties to the Prairie. These exports for 1914 were:—

Forest District.	Posts. Cords.	Props. Cords.	Ties. Pieces.
Cranbrook	15,971	7,525	507,813
Nelson	370	...	2,700
Totals	16,341	7,525	510,513

There is practically no export of posts, props, or ties to the United States. The values of unmanufactured exports in 1914 were:—

Logs	$ 720,000
Poles aand piles	240,000
Unsawn ties	150,000
Posts	130,000
Props	60,000
Total value of unsawn exports	$1,100,000

The total value of such exports in 1913 was $1,321,641. No immediate rapid increase in the annual exports of these products can be expected, for the low value of such materials precludes their being transported in great quantities for the long distance necessary to reach densely settled countries. Their consumption appears to be restricted chiefly to Western America, and may be expected to grow with the growth of population.

Lumber is the one item of export which has established the otherwise adverse balance of Provincial trade. The only important market developed for British Columbia during the past decade has been the Canadian Prairie. In the best of times the Canadian Prairie is a hotly contested market for lumber, as is shown by the following statement of imports from the United States during the past four years:—

IMPORTS INTO THE CANADIAN PRAIRIE FROM THE UNITED STATES OF LUMBER, LATHS, AND SHINGLES FROM JANUARY 1ST TO NOVEMBER 1ST, 1911; JANUARY 1ST TO NOVEMBER 1ST, 1912; JANUARY 1ST TO NOVEMBER 1ST, 1913; AND JANUARY 1ST TO NOVEMBER 1ST, 1914.

	1911.			1912.			Per Cent. Increase 1912 over 1911.
	Feet B.M.	Value.	Average per M.	Feet B.M.	Value.	Average per M.	
Planks, boards, etc., dressed one side, not dutiable	180,768,000	$2,324,994	$12 13	207,702,000	$2,377,262	$11 44	9
Sawn boards, etc., dutiable	31,348,000	390,803	12 11	49,291,000	645,670	13 00	53
	222,116,000	$2,715,801	.....	257,053,000	$3,022,932	.....	.....
	Pieces.			Pieces.			
Laths	56,220,000	134,795	2 31	63,750,000	134,624	2 11	0
Shingles	17,306,050	32,761	1 80	92,887,000	132,402	1 84	381
Totals	.....	$2,883,430	.....	.....	$3,289,958	.....	.....

IMPORTS INTO THE CANADIAN PRAIRIE FROM THE UNITED STATES—*Concluded.*

	1913.			Per Cent. Increase 1913 over 1912.	1914.			Per Cent. Increase 1914 over 1913.
	Feet B.M.	Value.	Average per M.		Feet B.M.	Value.	Average per M.	
Planks, boards, etc., dressed one side, not dutiable	106,298,000	$1,552,760	$14 61	49	71,130,000	$842,227	$11 85	33
Sawn boards, etc., dutiable	17,843,000	303,971	17 04	64	5,996,000	86,002	14 34	66
	124,142,000	$1,856,731			77,11 .000	$928,229		
	Pieces.				Pieces.			
Laths	32,998,000	78,361	$ 2 37	48	13,112,000	29,939	$ 2 28	60
Shingles	34,006,000	65,153	1 92	59	10,456,000	18,112	1 73	69
Totals		$2,000,245				$976,261		

Further competition which cannot possibly be eliminated during the next decade is that of the Prairie Spruce Mills, which cut 225,000,000 feet annually, and the Western Mills of Ontario, which send 50,000,000 feet a year. For several years past British Columbia has cut 1,000,000,000 feet to 1,200,000,000 feet of lumber for the Prairie trade. So acute was the building depression in 1914 that only about 700,000,000 was cut for the Prairie trade, and not all this quantity was delivered.

The situation plainly calls for general reorganization, for the mills of British Columbia have looked to the Prairie for a sufficient market during the past ten years. The output capacity for these mills is as follows:—

SAWMILLS, 1914.

Forest District.	No. of Mills.	Capacity per Ten-hour Day.	Capacity per Year of 300 Days.
Cranbrook	46	1,153,200	345,960,000
Fort George	16	200,000	60,000,000
Hazelton	12	41,000	12,300,000
Island	50	1,594,000	478,200,000
Kamloops	20	683,700	205,010,000
Lillooet	21	20,000	6,000,000
Nelson	32	877,000	263,100,000
Prince Rupert	18	392,000	117,600,000
Tete Jaune Cache	1	100,000	30,000,000
Vancouver	80	3,176,000	952,800,000
Vernon	29	282,000	84,600,000
Totals	334	8,518,900	2,555,570,000

The Prairie market has never yet in any one year taken over 60 per cent. of the output of these mills; the export market has not in any one year in the past decade taken 4 per cent. of the annual output. Manifestly the only relief which will enable the lumber industry to meet its obligations is an extension of export markets.

The part played at present by British Columbia in the export trade of the Pacific Coast is shown in the statement of the foreign exports for 1914:—

EXPORT CARGO, SHIPMENTS, 1914.

	From British Columbia.	From Washington and Oregon.
Africa	9,521,137	3,045,051
Atlantic Coast	6,439,892	26,209,981
Australia	5,850,426	176,706,113
United Kingdom and Continent	4,824,265	30,106,409
India	3,153,631	11,543,134
South Sea Islands	2,710,153	8,606,427
Japan	2,082,327	8,853,809
China	1,200,139	122,545,014
West Coast of South America	983,927	78,382,689
California	806,400	1,045,801,406
New Zealand	368,949	11,486,055
Hawaiian Islands	...	35,963,438
Panama	...	19,293,733
Philippine Islands	...	12,513,583
East Coast of South America	...	7,945,010
Alaska	...	6,516,627
Mexico	...	5,324,474
Central America	...	104,703
Totals	38,031,246	1,610,947,654

The same necessity for expansion of markets exists in the North-western States as in British Columbia. British Columbia, therefore, in striving for sufficient markets to keep her mills operating, will be forced to meet the keen competition of the American mills. The nature of that competition may be judged from the fact that, although the market in the Canadian Prairie has never been great enough to take more than three-fifths of our output, the Americans have in nearly every year of the past five supplied at least one-fifth of it. Although there is now free lumber into the United States, only 40,000,000 feet were shipped from British Columbia to the United States in 1914, as compared with the 77,000,000 feet imported into the Canadian Prairie from the United States during the same period.

To find and hold a wider lumber market will tax every resource of both manufacturers and Government through years of effort. There can, however, be no argument about the necessity of making an attempt.

The extension of markets for British Columbia is such a public necessity that it should engage the attention of the Government as the largest shareholder and as trustee of the public prosperity, though obviously no great improvement can be expected until the selling-price of lumber is again greater than the cost of producing it. This selling-price can only be increased by the operators of British Columbia and the North-western States.

The mills of the Western States with their 12,000,000,000 feet annual capacity will eventually determine the price at which lumber will be sold in export markets, both in the Canadian Prairie and elsewhere. Therefore, to stay in business, the British Columbia logger and manufacturer must meet American costs. That is the first essential. The present great variation in costs between different manufacturers in this Province shows that the average production costs may be reduced even as things are, while changing economic conditions in the near future will make this easier. Cheaper production and a more aggressive marketing system to bring consumers into closer touch with manufacturers are problems to be solved by the industry.

That the lumber industry has not yet sufficiently effective salesmen in the Prairie is shown by the number of farmers still without implement-sheds. The Conservation Commission

investigating this point found that the proportion of implement-sheds to farms in the different provinces was:—

MANITOBA.		SASKATCHEWAN.		ALBERTA.	
Farms.	Implement-sheds.	Farms.	Implement-sheds.	Farms.	Implement-sheds.
94	14	94	21	92	55

Implements are not more necessary to farmers than lumber to protect the implements. It has been a question of personal salesmanship.

The Government can rightfully help the lumber industry to advance into new markets in three ways: Firstly, by furnishing the lumberman data as to the strength and other characteristics of our timber for advertising purposes; secondly, by studying foreign markets and supplying information to the trade; thirdly, by making British Columbia products known in the markets which British Columbia manufacturers are endeavouring to enter. The wisdom and the propriety of this work cannot be too strongly urged. One of the most important Government obligations in forest-management in British Columbia is to cause the forests to bear their full share in the support of the community.

Though the Forest Branch endeavoured to make a systematic beginning in this work this year, the war unfortunately interfered, but information secured by the Branch has already resulted in the placing of important trial orders in British Columbia. Through co-operation with the Dominion Department of Trade and Commerce a great deal of information has been placed before British Columbia operators. Sample exhibits of manufactured lumber products have been sent to Dominion Trade Commissioners in important foreign lumber-importing countries. Information concerning the markets and foreign countries for special products has been secured from the actual importers and supplied to exporters here. Where foreign opportunities have been discovered samples have been sent.

THE PULP AND PAPER INDUSTRY.

One of the unlooked-for effects of war was the sudden flood of orders received by the pulp and paper mills of the Province. But for the shortage in available shipping there would have been a very large increase in their output. Even under existing circumstances business has been very brisk, as the following figures show:—

	Tons.
Shipments of paper	45,816
Shipments of high-class chemical pulp	10,608

TIMBER SALES.

Areas of Crown timber which are not obstructing agricultural settlement and which are not needed for present development are not being put on the market. Every endeavour is being made, however, to sell the following classes of timber: Small quantities of timber adjoining areas now being logged over where such timber would be wasted if not cut in connection with existing logging operations; areas of timber easily accessible to new railways, the cutting of which will aid in the development of new communities; timber standing on land needed for agricultural settlement; timber needed by pulp-manufacturing companies; and, finally, saw-timber, cordwood, mining-props, poles, shingle-bolts, or any other material necessary to supply the wants of the small operator or of settlers. Small contractors represent a growing class who are greatly assisted by the privilege of purchasing from the Government, because they can thus obtain timber on reasonable terms and in any quantity or location suited to their means and needs.

Slash left after the operations on the C.N.P. Ry., North Thompson Valley.

Brush-piling on timber sales. This one is located near Clinton in the Dry Belt. The forest is an open stand of Douglas fir. Note the low stumps.

For various reasons prices realized by timber-sales during 1914 have averaged somewhat higher than those commonly secured by private owners for similar timber, the average price for the 48,605,000 feet of timber sold being $1.15 per 1,000 feet. The average for each species in the different districts was:—

AVERAGE SALE PRICE BY SPECIES, 1914.

Sawtimber.	Board-feet.	Price per M.
Fir	25,224,000	$1 32
Cedar	14,596,000	1 12
Spruce	1,018,000	1 33
Hemlock	6,159,000	52
Balsam	215,000	58
White pine	223,000	80
Tamarack	639,000	1 82
Other species	531,000	50
Total	48,605,000	1 15

In general, the year 1914 was one of severe depression in the lumbering business. Such conditions naturally affected timber-sales. The volume of the timber-sale business in 1914 is shown by the following table:—

TIMBER-SALES AWARDED BY DISTRICTS, 1914.

District.	No. of Sales.	Area in Acres.	Estimated Quantity.						Estimate of Revenue.
			Board-feet.	Poles.	Piles.	Ties.	Cord-wood.	Posts.	
Saw-timber.									
Cranbrook	6	447	760,000	...	...	12,520	1,400	25,000	$ 3,309 25
Fort George	9	1,240	3,166,905	100	...	...	1,000	...	11,089 73
Hazelton	1	160	1,013,000	...	...	...	...	...	1,359 70
Island	...	...	...	...	...	...	...	...	...
Kamloops	...	...	...	...	...	...	...	...	...
Lillooet	10	1,669	1,949,000	...	...	6,000	1,200	...	3,971 50
Vernon	1	7	...	7,500	...	...	...	...	93 81
Prince Rupert	2	333	115,000	2,255	...	...	200	...	741 90
Tete Jaune	...	...	...	...	...	...	...	...	...
Vancouver	30	3,491	49,053,248	2,823	232	...	3,815	...	61,434 19
Vernon	2	360	175,000	...	...	...	...	...	345 20
Totals	61	7,707	56,232,243	12,678	232	18,520	7,615	25,000	$82,345 37
Pulp-timber.									
Vancouver	10	20,425	221,845,663	...	...	...	...	...	267,613 32
Totals	71	28,132	278,077,906	12,678	232	18,520	7,615	25,000	$349,958 69

Both to the Forest Branch and the public the most important matter has been the sale of fractions adjoining existing operations, and the sale of small quantities of timber to small loggers or contractors. Such purchasers do not, as a rule, apply for timber until they are in immediate need of it, and then delay in selling may kill the sale. I hope to effect improvements in the procedure under which timber-sales are being handled, so that these may be handled more expeditiously in future.

Logging on areas under timber-sale during the year was seriously affected by the depression in the lumber industry. The poor market for logs after the outbreak of war rendered it necessary to extend for one year several sales for which the contracts were expiring within the next

few months. The volume of logging and the revenue actually derived from timber-sales during 1914 is shown in the following table:—

District.	Quantity cut from Timber-sales during 1914.	Net Revenue including Stumpage, Royalty and Rental.
	Board-feet.	
Vancouver	29,146,913	$46,950 81
Cranbrook	4,540,059	11,288 90
Lillooet	1,026,119	1,373 78
Prince Rupert	933,128	946 44
Fort George	581,228	3,000 18
Kamloops	14,850	303 77
Nelson	417,961	531 83
Totals	36,660,258	$64,395 71

The receipts from timber-sales have already become an appreciable item in the revenue of the Forest Branch; and as the markets for lumber increase, and as transportation facilities improve in the districts where the Province holds in reserve large quantities of timber, this source of revenue will become of great importance. For instance, timber explorations by the Forest Branch have shown that, particularly in the northern valley of the Hazelton and Fort George Districts, there are billions of feet of merchantable timber which will sooner or later be made accessible. This timber will produce revenue when transportation is provided, and will support large lumber and pulp-manufacturing enterprises. Its future value depends only upon fire-protection.

It has been found advisable to cruise and advertise in advance of application small areas of timber in those districts where loggers and contractors depend upon purchasing a proportion of their needs from the Government. During 1914 the quantity of timber cruised and advertised in this manner was as shown in the following statement:—

TIMBER NOW OFFERED FOR SALE.

District.	Area in Acres.	Estimated Quantity.							Total Estimated Value, including Stumpage and Royalty.
		Board-feet.	Ties.	Cordwood.	Poles.	Cords of Shingle-bolts.	Posts.	Cords of Pulp-wood.	
Saw-timber.									
Cranbrook	1,880	2,448,792	15,000	...	...	...	...	...	$ 4,038 00
Hazelton	1,088	5,638,000	...	...	...	...	...	...	5,638 00
Lillooet	1,511	1,500,000	50,000	2,653	...	...	...	...	3,400 00
Nelson	1,933	12,877,090	28,500	...	30,775	...	...	...	15,598 51
Prince Rupert	562	1,137,000	...	...	...	...	...	...	1,719 00
Tete Jaune	8,785	17,725,000	34,000	...	...	...	...	...	20,295 75
Vancouver	13,872	159,137,811	12,970	1,800	10,763	837	2,000	1,542	240,875 51
Vernon	200	375,000	...	...	...	...	...	...	907 50
Totals..	29,831	200,838,693	140,470	4,453	41,538	837	2,000	1,542	...
Pulp-timber.									
Vancouver	1,346	16,220,000	...	...	...	122	...	...	22,315 85
Totals..	31,177	217,058,693	140,470	4,453	41,538	959	2,000	1,542	$315,508 12

In addition, there has been a quantity of timber cruised, and now awaiting advertisement, as shown below:—

TIMBER NOT YET OFFERED FOR SALE.

District.	Area.	Estimated Quantity.							Estimated Value, including Stumpage and Royalty.
		Board feet.	Cords of Pulp-wood.	Cordwood.	Piles.	Cords of Shingle-bolts.	Poles.	Ties.	
Saw-timber.									
Fort George	10	...	...	837	...	...	...	...	$ 420 00
Hazelton	115	147,000	...	480	...	...	...	...	450 00
Vancouver	5,344	25,021,688	330	2,106	290	10,283	1,330	...	47,180 00
Kamloops	11	...	...	...	...	...	...	2,500	100 00
Prince Rupert	50	397,000	...	...	...	...	...	...	400 00
Totals..	5,530	25,565,688	330	3,423	290	10,283	1,330	2,500	...
Pulp-timber.									
Vancouver	2,001	35,520,000	...	...	...	...	...	...	44,400 00
Totals..	8,140	61,085,688	330	3,423	290	10,283	1,330	2,500	$93,055 00

Areas cruised for sale purposes during the year were chiefly fractions remaining in districts now being logged, important areas not being placed on the market. That the stumpage value of scattered fragments should amount to close on half a million dollars is a very strong argument for the most effective fire-protection in the timber reserve of the Province.

Clean logging and the leaving of the ground in shape for settlement (where the land is agricultural) or for the production of another forest crop of valuable species (where the ground is non-agricultural) are aimed at by the timber-sale regulations. The character of these regulations depends upon local conditions, the idea being to require every purchaser to log according to the standard set by the best loggers of the district, and to dispose of slash in a manner which will favour reproduction of the most valuable species. In fixing the upset price for sales allowance is made for the estimated cost of carrying out such regulations.

Each purchaser deposits before logging 10 per cent. of the estimated value of the sale. This deposit is not refunded until the logger complies satisfactorily with the regulations. On nearly all sales so far completed compliance with regulations has been satisfactory. Only in a few cases has it been necessary to retain the 10 per cent. deposit mentioned above, to cover the cost of slash-disposal.

In the Coast District the force of Rangers has not been sufficient to administer timber-sales effectively, for during the summer the men on duty were occupied entirely with the supervision of fire-fighting and patrol. Clean logging such as will return to the Government full stumpage value for the timber on each area sold can only be secured by frequent checking-up of high stumps, long tops, and logs left in the woods by careless operators, which in the aggregate may amount to half or even more of the timber which would be taken off by good loggers. Inspection of each sale should be made at least once a month to protect the Government's financial interest in the timber, and the cost of such inspection would be more than met by added revenue.

Up to the present clean cutting and slash-burning have been the only measures enforced by the Forest Branch in timber-sales. Other regulations have not been considered feasible for the class of land now being logged and in the present condition of the lumber business. There are three ends to be met—the prosperity of the logger, the complete utilization of the timber, and the encouragement of a second crop. No system of cutting should be introduced which will unduly increase the cost of logging without returning results commensurate with the cost. Under present conditions there is often a loss of profit where only a portion of the stand is taken owing to the great cost of the improvements necessary for logging, the fire hazard created, the probability of loss by fire or windfall after the first logging, and the increased cost of slash-disposal. Therefore the regulations in Forest Branch timber-sales are being based upon clean cutting and broadcast slash-burning.

In nearly all situations where timber-sales have taken place it is believed that broadcast slash-burning will both remove the danger of future fires and assist in producing a valuable second growth. If not, modifications of the regulations must be tried: but, whatever the modifications, they cannot be enforced with success unless the cost is sufficiently low to leave the logger a profit.

A sample of the timber-sale regulations used in mixed fir and cedar on the Coast is quoted below:—

The following trees will be cut: All living and dead and down Douglas fir and cedar trees and all hemlock and balsam trees 20 inches and over in diameter at breast height, containing 50 per cent. or over of merchantable timber suitable for the manufacture of any grade of lumber, as directed by the officer of the Forest Branch in charge.

Stumps will be cut so as to cause the least practicable waste, and will not be cut higher than the diameter of the tree at the point where it is cut, and in no case higher than 30 inches on the side adjacent to the highest ground, except in unusual cases in the discretion of the officer of the Forest Branch in charge.

All trees will be utilized to as low a diameter in the tops as practicable, so as to cause the least waste, and to the minimum diameter of 10 inches, when merchantable in the judgment of the officer of the Forest Branch in charge. Log-lengths will be varied so as to provide for the complete utilization of merchantable timber.

Brush will be disposed of as follows: After logging, brush will be burned broadcast by the lessee at his own expense, as directed by the officer of the Forest Branch in charge.

Merchantable trees designated for cutting which are left uncut, timber wasted in tops and stumps, trees left lodged in the process of felling, and any merchantable timber which is cut and not removed from any portion of the cutting area after logging on that portion of the cutting area is completed shall be scaled, measured, or counted as hereinbefore provided, and paid for as follows: At the rate of $1.50 per 1,000 feet, such sums to be due upon receipt of account.

The cost of carrying out such regulations is only a few cents per acre. The results appear up to the present to be excellent.

The regulations are varied in different forest regions. The following regulations were used on sales of tie-timber in lodge-pole pine forest in Cranbrook District:—

The following trees will be cut: All trees suitable for the manufacture of rail-road ties, as [illegible] by the District Forester at Cranbrook.

Stumps will be cut so as to cause the least practicable waste, and will not be cut higher than the diameter of the tree at the point where it is cut, and in no case higher than 18 inches on the side adjacent to the highest ground, except in unusual cases in the discretion of the officer of the Forest Branch in charge.

All trees will be utilized to as low a diameter in the tops as practicable, so as to cause the least waste, and to the minimum diameter of 8 inches, when merchantable in the judgment of the officer of the Forest Branch in charge. Log-lengths will be varied so as to provide for the complete utilization of merchantable timber.

Brush will be disposed of as follows: Tops will be lopped and all debris resulting from the operation will be brought into as close contact as possible with the ground, as directed by the District Forester at Cranbrook.

The first pulp-sales made under the "Forest Act" were completed during 1914, when 222,000,000 feet of timber, chiefly hemlock, spruce, and balsam, comprised in eleven tracts covering 19,555 acres, accessible from salt water in the Vancouver Forest District, were sold to one company under a thirty-year contract. The prices realized for the various species, in addition to royalty, were:—

Species.	Board-feet.	Price per M.
Fir	4,311,000	$1 13
Cedar	29,911,000	94
Spruce	43,449,000	70
Balsam	47,112,000	19
Hemlock	96,932,000	22
White Pine	130,000	1 00
Total	221,845,000	...

Means are provided in the contract for increasing the royalty on this timber in accordance with the terms of the "Royalty Act."

The greater part of the area covered by these pulp-wood sales is non-agricultural and valuable only for the production of timber. Therefore all the sale contracts require complete utilization of timber and such slash-disposal as will bring about conditions conducive to the growth of another timber-crop. Such regulations must necessarily be adapted to the particular needs of each sale. The clauses quoted below are representative of the efforts of the Forest Branch to accomplish such management as is now economically possible on the Coast.

The following trees will be cut:—

All living and dead and down cedar and fir trees, containing 50 per cent. or more of timber suitable for the manufacture of pulp or lumber; all living and dead spruce, hemlock, and balsam-fir trees 10 inches or more in diameter at the stump, containing 50 per cent. or more of sound timber; and all cedar suitable for telephone and telegraph poles, as directed by the Forest Officer in charge.

Stumps will be cut so as to cause the least practicable waste, and will not be cut higher than the diameter of the tree at the point where it is cut, and in no case higher than 30 inches on the side adjacent to the highest ground, except in unusual cases in the discretion of the officer of the Forest Branch in charge.

All trees will be utilized to as low a diameter in the tops as practicable, so as to cause the least waste, and to the minimum diameter of 10 inches for cedar and Douglas fir, and 6 inches for hemlock and balsam fir and spruce, when merchantable in the judgment of the officer of the Forest Branch in charge. Log-lengths will be varied so as to provide for the complete utilization of merchantable timber.

Brush will be disposed of as follows: After logging, brush and slash will be burnt by the lessee as directed by the Forest Officer in charge, or according to the instructions in writing issued by the Forest Officer in charge.

The cruising completed by the Forest Branch has shown that comparatively large quantities of fine pulp-timber still remain available on Crown lands, both in the Island and Vancouver Forest Districts, and in the valleys of the Nass, Babine, Finlay, Parsnip, Willow, and Bear Rivers. These timber areas are being held under reserve so as to be available for future industries.

LOGGING INSPECTION.

There were 926 logging operations in the Province during 1914, distributed as shown below:—

District.	Logging Operations.	Hand-loggers.
Cranbrook	117	...
Fort George	22	...
Hazelton	13	...
Island	102	1
Kamloops	47	...
Lillooet	22	...
Nelson	166	...
Prince Rupert	1	132
Vancouver	166	37
Vernon	100	...
Totals	756	170

Though inspection of logging operations by the Rangers was kept up through the year, each operation was only visited once in six months on an average, the small number of Rangers employed greatly hindering the work during the summer fire season. Yet, even so, the results were excellent in enforcing the timber-marking regulations upon which so much revenue depends, in preventing the employment of Orientals, stopping logging upon unsurveyed licences and preventing trespass, and in securing co-operation of operators in slash-burning and closer utilization of timber. As market conditions improve it will gradually become possible for the Forest Branch to raise the standard of utilization in logging operations to that set by the best loggers. Such a policy will, when adopted, work out to the profit of all concerned. Similarly, the Branch can do a great deal to reduce the risk of serious fires by keeping in touch with loggers and securing compliance with the provisions of the "Forest Act."

Generally speaking, the aim of inspection is to give service to the logger to secure the prompt transaction of business and prevent trespass. A number of trespasses occurred, however, in 1914. The extent of these may be judged from the following table:—

Districts.	No. of Cases.	Area in Acres.	Quantity Cut.					No. of Results being Seized.	Amount realized.
			Feet, B.M.	Lineal Feet.	Cords.	Ties.	Posts.		
Cranbrook	7	60	33,887	...	196½	...	10,567	..	$ 361 65
Fort George	16	515	230,285	30,800	318	32,792	...	3	1,477 99
Kamloops	3	37	276,532	7,325	...	...	...	..	320 06
Lillooet	8	...	...	17,556	200	...	...	..	1,439 96
Nelson	16	200	339,351	41,435	895	17,820	...	1	1,685 25
Prince Rupert	3	20	19,596	45,441	...	...	...	3	363 05
Vancouver	13	300	021,000	24,635	60	2,090	...	2	1,815 15
Vernon	8	308	1,144,974	...	70	1,144	...	..	964 80
Totals	74	1,539	2,062,625	167,201	1,709½	53,842	10,567	9	$8,429 91

The facilities offered for making small timber-sales are having an undoubted effect in reducing trespass.

Very few infractions of the timber-marking regulations now occur, though the temptation is sometimes great enough. Two seizures were made for improper marking of logs.

RAILWAY PERMITS.

The worst danger in railroad-construction has been the fire hazard created by slash from the cutting of ties and timbers on lands adjoining the right-of-way; and as a considerable portion of the 2,000 miles of railway which has been under construction in this Province is in hitherto unopened forests, the whole future of the lumbering industry in many new regions has depended upon effective supervision of this hazard. The system under which the railway companies have been required to obtain permits for all cuttings has proved very effective in securing clean logging and brush disposal, while, by defining cutting to definite areas, it prevented desultory operations and the mere culling of extensive stands of timber.

Sample Regulations governing Permit Cuttings.

1. All tops to be lopped, and slash and debris resulting from the cutting must be piled to keep pace with the logging operations in compact piles in such manner that it can be burned without danger to the standing timber; such debris to be burned by the railway company, as directed by the District Forester at Lillooet.

2. When approaching boundary-lines, timber to be thrown, where practicable, in towards the cutting area, thereby leaving at least 50 feet free of slash and debris along these lines.

3. Where brush is dense, a fire-break consisting of a trail cleared of all inflammable material for a width to be left to the discretion of the District Forester.

4. No long butting will be allowed; where timber is too heavy butted to work into square timber needed, same shall be cut into short log-lengths, and be utilized, except in cases of defect.

5. Stumps must be cut so as to cause the least practicable waste, and should not be cut higher than the diameter of the tree at the point cut, except in unusual cases.

6. All trees must be cut to as low a diameter as practicable in the tops, so as to cause as little waste as possible.

7. The right is reserved to alienate any lands for agricultural purposes, covered by this permit, which do not carry timber in excess of 5,000 feet per acre.

8. The District Forester to be advised in writing one week previous to commencement of any operations on this permit.

9. Cutting by settlers under section 9 of the "Forest Act" will be allowed on any portion of the area.

During the year fifty-four permits, covering 51,000 acres, were issued to the Pacific Great Eastern, Canadian Northern Pacific, and Kettle Valley Railways. The location of the cuttings was as follows:—

Forest District.	No. of Permits.	Area.
		Acres.
Vancouver	6	3,860
Fort George	26	21,284
Kamloops	2	630
Vernon	9	12,878
Lillooet	11	12,355
	54	51,007

While every facility has been given the railroads to obtain necessary construction material, the interests of settlers have been borne in mind, so that the granting of permits should not interfere with the needs of local residents for cordwood and other timber. Where agricultural areas were involved the land has been logged, cleaned up, and thrown open for settlement as promptly as possible. It should be noted, also, that the considerable areas of timber land dealt with indicate large timber resources in the regions opened up by the new lines—resources that will assist settlement by attracting capital and labour for the lumbering business which has pioneered development in so many regions of the West already.

A general view of the effect of the regulations under which permits covering 180,283 acres have been issued during the past two years shows that this matter has been handled in a very satisfactory manner. While exercising close supervision, the District Foresters and Rangers have secured the co-operation of railway officials, with the result that the fire-danger on lands logged during railway-construction has been reduced to a minimum.

FOREST INVESTIGATION.

Although the first and most pressing duty of the Branch has been forest protection and administration, it is plain that in the long run the progress of the work depends on a better knowledge of our forests, and though, under present circumstances, money should not be spent in acquiring information which cannot now serve any purpose, there are certain points upon which the Branch must be informed before wise policies can be developed. Some of the more important points requiring investigation are the conditions affecting reproduction of various important commercial species, so that brush-disposal and cutting regulations to favour those species may be developed as far as is commercially possible; the rates of growth of the various species in different types of soil, necessary in order that we may know how soon another crop of merchantable timber will be produced; and the volume in board-feet of trees of different sizes of each species in different regions, so that cruising may be based on exact methods, and not on guesswork.

The staff of the Forest Branch up to the present has not been sufficient to undertake any systematic investigative work such as that now carried on in other forest administrative organizations of equal importance. The officers of the Forest Branch are, however, fully aware of the importance of this branch of the work, and as opportunity offers are collecting the data which will form the basis of sound forest administration in the Province.

The greater part of the 75,000 acres logged over in British Columbia each year is land whose only possible crop is timber. The continued prosperity of the Province depends upon the eventual adoption of systems of logging or slash-disposal that will encourage on such lands the natural reproduction of valuable tree species. To do this we must know what conditions affect regeneration.

The most important species, in point of commercial value and area logged over each year, is Douglas fir. A co-operative study of the conditions affecting Douglas fir second growth on the lower coast was made during the summer by the Commission of Conservation and the Forest Branch. The following is a summary of the results obtained by Dr. Howe, of Toronto University, who was in charge of the work for the Commission of Conservation:—

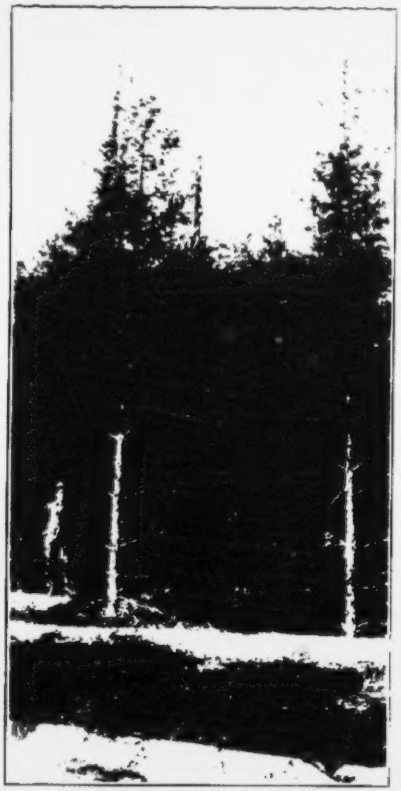
"During the past summer an investigation was made by the Commission of Conservation to determine the conditions under which the reproduction of commercial tree species is occurring most advantageously in the coastal region of British Columbia. Particular attention was paid to the effect of fire upon the reproduction of Douglas fir, which is the most valuable and most widely distributed species in the Province. The study was conducted by Dr. C. D. Howe, of the Faculty of Forestry, University of Toronto. In this work the Forest Branch co-operated by assigning a Forest Assistant to work with Dr. Howe, and by furnishing a considerable amount of information from the head office at Victoria. It is expected that Dr. Howe's report will be published at a later date by the Commission, and that copies will be available for distribution.

"The report emphasizes the fact that the popular assumption that nature alone will provide satisfactorily for the replacement of valuable commercial forests on cut-over and burned-over lands is only partially true. Nature is oftentimes wasteful in her methods, and needs to be aided by man in order to secure the best results. This is particularly true in regard to forest resources. The detailed investigations made by Dr. Howe show, in the first place, that the burning of logging-slash, at selected times and under proper supervision, not only greatly reduces the fire hazard, but favours the reproduction of Douglas fir by exposing the mineral soil. However, repeated fires and fires occurring during dry periods not only destroy the young growth, but the seed-trees as well, thus preventing or greatly retarding the establishment of a stand of commercial species. As a general rule, a sufficient number of seed-trees is left after logging, so that one fire leaves enough for seeding purposes. Each fire thereafter, however, reduces them in proportionately larger quantities. Thus, through the diminution of seed-trees, each fire makes it increasingly difficult to re-establish the forest on the repeatedly burned areas. On this account, in many sections reproduction of valuable species is wholly inadequate in amount or is entirely lacking, since each successive fire diminishes the earning capacity of the area from the point of view of timber production, and makes artificial planting the more necessary; and this is impracticable at the present time on any large scale on account of the great expense involved. The same results can, however, be secured at relatively slight expense by providing more adequate protection from fire on cut-over lands, especially those bearing young forest-growth at the present time. In a sense, protection of young growth is more essential than in mature timber, since the effect of fire is so much more disastrous, a single fire entirely destroying the young trees, while the old timber is very fire-resistant, being covered by a thick covering of bark. The additional protection needed naturally means the employment of a larger patrol force than has previously been practicable on account of the limited funds available."

This investigation has shown that broadcast burning of slash after logging is completed will favour the natural reproduction of Douglas fir. Subsequent fires will, however, kill out the second growth. The conditions affecting the regrowth of the remaining commercial species of the Province have not yet been studied, though field officers of the Forest Branch are securing a certain amount of data for their particular districts.

No thorough study has yet been made of the rate of growth of any of our timber on different sites. I propose paying some attention to this work during the coming year, in order that some opinion may be formed as to the length of time necessary to grow a second crop in logged and burned districts. This information may be gained by the existing staff at slight expense.

The merchantable contents of trees vary so greatly in different localities that volume tables must be based on actual measurements before accurate estimating is possible. Volume tables have been made of the important species of the lower coast and are printed herewith.

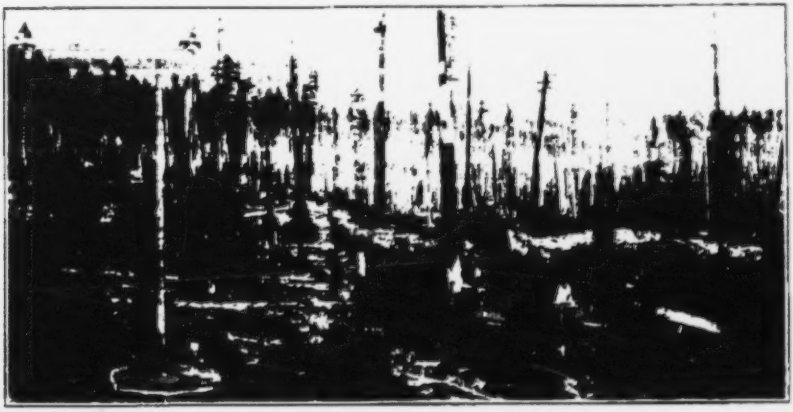


Douglas fir sixteen years old, 1,200 trees per acre, on area burned once.

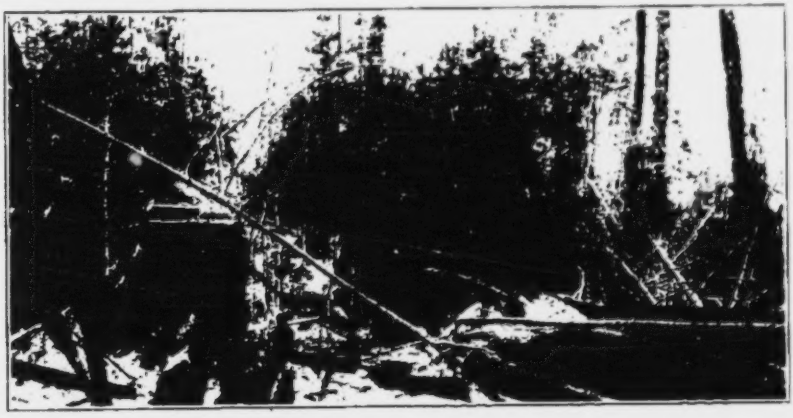
Second-growth fir on area logged about fifty years ago, near Port Moody. Not burned since logging.

Logged and burned twelve years ago; 5,000 fir, 1,300 cedar, and 400 hemlock seedlings per acre, near Shawnigan Lake.

An area burned severely at least twice. Before the last fire it was well covered with young fir-trees, the remains of which can be seen, by careful observation, in the foreground.



Burned twice since logging, the last being a light ground fire. Compare **abundance** of reproduction with that on areas burned only once.



Young fir and hemlock killed by fire in 1914. The seed trees have been killed, so another stand cannot re-establish itself here.

VOLUME TABLE FOR CEDAR.

(Giving Merchantable Contents, British Columbia Rule, under Present Conditions, with no Allowance for Breakage or Defect. Compiled from Measurements taken of 354 Trees on the Lower Coast.)

D.B.H.	Short.	Medium.	Tall.	D.B.H.	Short.	Medium.	Tall.
Inches.				Inches.			
20	190	290	410	42	1,440	1,895	2,340
22	260	375	530	44	1,650	2,125	2,600
24	335	475	660	46	1,865	2,370	2,875
26	420	585	800	48	2,090	2,640	3,175
28	510	705	960	50	2,330	2,925	3,515
30	600	835	1,115	52	2,580	3,220	3,865
32	710	975	1,300	54	2,835	3,525	4,250
34	825	1,125	1,485	56	3,105	3,840	4,650
36	960	1,290	1,685	58	3,360	4,150	5,080
38	1,100	1,475	1,890	60	3,630	4,480	5,530
40	1,260	1,675	2,100				

VOLUME TABLE FOR HEMLOCK.

(Giving Merchantable Contents, British Columbia Rule, under Present Conditions, with no Allowance for Breakage or Defect. Compiled from Measurements taken of 207 Trees on the Lower Coast.)

D.B.H.	Short.	Medium.	Tall.	D.B.H.	Short.	Medium.	Tall.
Inches.				Inches.			
16	220	300	410	30	1,030	1,440	1,730
18	300	410	530	32	1,230	1,680	2,040
20	385	530	670	34	1,450	1,950	2,380
22	480	670	830	36	1,680	2,260	2,780
24	590	830	1,020	38	1,930	2,580	3,200
26	715	1,010	1,225	40	2,200	2,920	3,620
28	865	1,210	1,470				

VOLUME TABLE FOR DOUGLAS FIR.

(Giving Merchantable Contents, British Columbia Rule, under Present Conditions, with no Allowance for Breakage or Defect. Compiled from Measurements taken of 726 Trees on the Lower Coast.)

D.B.H.	Short.	Medium.	Tall.	D.B.H.	Short.	Medium.	Tall.
Inches.				Inches.			
22	350	440	600	44	2,250	3,020	3,810
24	420	560	750	46	2,550	3,370	4,230
26	510	710	920	48	2,875	3,750	4,675
28	610	880	1,130	50	3,225	4,150	5,130
30	730	1,075	1,375	52	3,580	4,565	5,610
32	890	1,280	1,650	54	3,980	5,000	6,090
34	1,060	1,520	1,955	56	4,350	5,475	6,580
36	1,250	1,770	2,280	58	4,775	5,950	7,075
38	1,470	2,050	2,640	60	5,230	6,460	7,575
40	1,700	2,350	3,010	62	5,750	7,000	8,080
42	1,970	2,675	3,400				

Some measurements for volume tables for the Interior districts are being collected this winter.

Much new information has been gained during the past three seasons concerning the range of commercial timbers in the Province, and it is now clear that the forests of British Columbia are more extensive and more valuable than is indicated by botanical or forest literature.

The survey of the timber resources of the Province conducted by the Commission of Conservation in co-operation with the Forest Branch is still going forward. It is expected that field-work will be completed during the coming year. The Commission has shown great interest in the matter and have assisted generously in the prosecution of investigations.

LAND CLASSIFICATION.

There are three important reasons for classifying lands in this Province before they are alienated from the Crown: (1) To prevent the alienation of land valuable chiefly for timber; (2) to make available for settlement all areas suitable for agriculture; (3) to hold under reserve lands which are unfitted for agriculture. These three principles of classification of public lands have been adopted in nearly all the countries of the world, and are now practised to an increasing extent each year by the different land administrations in Canada. The results of such a classification of public lands are twofold—the confining of settlement to agricultural lands, where such settlement is prosperous and productive, and the segregating of non-agricultural lands for fire-protection and management of the timber-crops.

During the year the land-classification work of the Forest Branch was devoted chiefly to cruising and securing the reserve upon public lands carrying timber over the statutory limit.

The total area of unalienated public lands classified during 1914 was 492,298 acres. In addition to this, 12,000,000 acres, a great deal of which is unalienated, was covered by forest reconnaissance parties. This is dealt with elsewhere in this report. The balance referred to here consists of tracts for which some form of application has at some time been made, and for which particular information was necessary to decide the disposition of the land.

During the year 167,456 acres, carrying 956,000,000 feet of timber, were put under reserve, and information was secured by field parties during the past season which will place under reserve a considerable portion of the 12,000,000 acres mentioned above. It is important in the present condition of the timber market that important bodies of timber such as these, which represent an asset of many million dollars, should remain off the market under public control.

The examination of logged-over and expired timber licences and leases was continued through the year in order that final disposition might be made of the lands. In certain districts of the Province where the remaining unalienated public lands are valuable chiefly for timber, applications for alienation are so far as possible examined by the Forest Branch before disposition of the land is decided by the Lands Department. A large area of lands so applied for in timbered districts was examined.

EXPIRED LICENCES AND LEASES, APPLICATIONS TO PURCHASE, AND PRE-EMPTIONS EXAMINED IN 1914.

Forest District.	Area.	Agricultural Land.	Area recommended for Reserve.	Estimate of Timber.
	Acres.	Acres.	Acres.	Board-feet.
Cranbrook	53,119	16,827	21,202	21,508,625
Fort George	8,647	7,400	7,547	73,516,100
Hazelton	20,067	12,307	10,060	139,001,842
Island	70,127	26,524	25,558	297,313,810
Kamloops	4,640	2,864	625	2,000,000
Nelson	10,825	8,902	5,353	15,895,300
Prince Rupert	30,450	15,761	13,920	7,993,000
Vancouver	189,424	41,977	79,561	371,731,118
Vernon	104,999	1,595	3,630	27,239,692
Totals	492,298	134,157	167,456	956,799,577

The result of the examination of these lands is to retain for the public benefit timbered lands which, if they passed into private hands, would be sold or logged for their timber value in competition with lands now held under lease or licence. Cases occur where the timber is worth far more than the land; for instance, by the retention of 160 acres out of an area of 193 a timber revenue of $2,739 was secured; a similar area comprised in Timber Sale X282 has a timber value of $4,125 apart from the land, which can be sold separately, and so on.

In addition to the above, 7,860 acres were cruised for other branches of the Government service.

Areas desired for mill-site purposes or booming-grounds are now examined by the Forest Branch. During 1914 sixteen applications were received, twelve were dealt with, and four still await action.

SCALING AND GRADING.

The system of licensing scalers in the Interior districts of the Province, which was inaugurated in 1913, was extended during the past year, fifty-six men passing the examination successfully. The total number of licensed scalers is now 159. In two cases licences were cancelled as penalty for ill-conduct. Reports from every district speak highly of the improvement shown in scaling-work since the new system has been introduced. As the duties of a licensed scaler make him in part the agent of the Government, it is recommended that those whose work, tested by check-scaling, is found to reach a certain standard of accuracy should receive a Government grant based on work done. In every district Rangers on the staff of the Branch will be required to qualify scaler's licences during the present year.

On the Coast the Official Scalers are now charged with the work of grading logs under the provisions of the new "Royalty Act." Besides acting for the Government, an Official Scaler holds the balance between logger and manufacturers, and accurate judgment as to the true contents of logs is thus doubly necessary. Scaled booms are therefore tallied through the mills when opportunity offers, and in the following table some results are shown which fully justify (in the case of cedar) both the grades established by the Branch and the judgment shown by the scalers in interpreting these grades. The contention of the Branch that No. 2 grade would yield 10,000 shingles per 1,000 feet scale measurement is shown in this table to be correct.

CEDAR-SCALING—SHINGLE TESTS.

No. 2 Grade Logs.

Mill No.	No. of Logs.	Scale B.M.	No. 1 Shingles.	No. 2 Shingles.	Total Shingles.	No. 1. Average per M. Ft.	No. 2. Average per M. Ft.	Total Average per M. Ft.
1	20	19,203	214,481	12,600	227,081	11.17	0.65	11.82
2	22	14,289	140,250	6,000	146,250	9.81	0.42	10.23
3	22	16,317	156,050	16,460	172,510	9.563	1.008	10.571
4	27	17,772	161,500	9,500	171,000	9.08	0.54	9.621
	91	67,581	672,281	44,560	716,841	9.95	0.66	10.61

No. 3 Grade Logs.

Mill No.	No. of Logs.	Scale B.M.	No. 1 Shingles.	No. 2 Shingles.	Total Shingles.	No. 1. Average per M. Ft.	No. 2. Average per M. Ft.	Total Average per M. Ft.
2	24	24,116	182,750	24,500	207,250	7.57	1.01	8.58
3	4	1,672	12,440	2,250	14,690	7.44	1.34	8.78
	28	25,788	195,190	26,750	221,940	7.56	1.03	8.60

No. 1 Grade Logs.

Mill No.	No. of Logs.	Scale B.M.	No. 1 Shingles.	No. 2 Shingles.	Total Shingles.	No. 1. Average per M. Ft.	No. 2. Average per M. Ft.	Total Average per M. Ft.
2	2	1,551	15,500	1,500	17,000	9.99	0.97	10.96
3	1	1,070	11,740	250	11,990	10.97	0.23	11.20
	3	2,621	27,240	1,750	28,990	10.39	0.67	11.06

An attempt was made during 1914 to segregate the cut into species, and the following table gives the approximate figures obtained. Douglas fir comprises almost half of the total cut. Douglas fir and red cedar together comprise more than 70 per cent. of all the timber cut in the Province in 1914.

SPECIES CUT.

Forest District.	Douglas Fir.	Red Cedar.	Spruce.	Hemlock.	Balsam Fir.	Yellow Pine.	White Pine.	Larch.	Yellow Cedar.	Cottonwood.	Birch.	Totals.
	M.B.M.	M.B.M.	M.B.M.	M.B.M.	M.B.M.	M.B.M.	M.B.M.	M.B.M.	M.B.M.	M.B.M.	M.B.M.	M.B.M.
Cranbrook	28,788	4,355	13,043	.....	2,000	19,457	.....	24,766	.....	.....	.....	97,479
Fort George	4,981	.....	2,655	.....	.....	.....	426	.....	.....	.....	.....	8,012
Hazelton	44	927	975	903	.....	.....	.....	.....	.....	30	8	2,337
Kamloops	7,373	2,183	2,918	.....	.....	6,714	.....	.....	.....	.....	.....	19,188
Lillooet	2,600	28	156	.....	.....	86	.....	.....	.....	.....	.....	2,878
Nelson	13,862	10,541	1,457	517	.....	8,648	.....	2,941	.....	.....	.....	37,966
Vernon	2,920	2,697	.....	.....	.....	10,753	1,644	.....	.....	.....	.....	17,914
Island	68,104	28,107	6,900	19,442	5,012	.....	762	.....	.....	.....	.....	128,333
Prince Rupert	850	1,347	6,050	326	1,290	.....	5	.....	85	.....	.....	10,162
Vancouver	241,500	140,500	35,000	44,190	5,700	.....	1,500	.....	.....	170	.....	468,560
Totals	370,878	190,085	74,109	65,008	14,092	45,660	4,337	27,707	85	200	8	792,529

Totals: M.B.M., 792,529.

The following table divides the output of the year into four classes—board feet for logs; lineal feet for poles and piles; railway ties by number cut; and cords for shingle-bolts, mine-props, fence-posts, and fuel. This information is given for each Forest District for each month of the year.

GRAZING.

Owing to the emergency created by the bad fire season, which demanded the attention throughout July and August of the Victoria staff, it was not possible to begin the investigation into grazing conditions until September. Consequently only two districts, the Nicola and Lillooet, were examined. The investigation, however, showed plainly the need of a definite policy in regard to the use of Crown land for the grazing of stock. When completed, the investigation will indicate the lines upon which this important matter should be handled.

FOREST RESERVES.

On December 31st, 1914, a notice appeared in the British Columbia Gazette to the effect that certain lands in the Elk River Valley have been made a forest reserve. That notice marked the establishment of the first Provincial forest reserve in British Columbia.

The Elk River Reserve is situated at the headwaters of the river, and the Alberta line forms its eastern boundary. It covers an area of approximately 100 square miles. The land bears timber and is underlaid with coal; it possesses also many attractions in the way of scenery and game. None of the land is suitable for agriculture. As a whole, the area is suitable only for growing timber, and it is for this reason it has been made a forest reserve. The timber will be valuable for the Prairie market and for use in local coal-mining, the establishment of the reserve in nowise preventing utilization of its resources.

The Calgary and Fernie Railroad will pass through the reserve, making accessible its wealth of timber, coal, and scenery, and aiding in their use and development. On the east is the Rocky Mountains Forest Reserve in Alberta, nearly 10,000,000 acres in area, under the jurisdiction of the Dominion Government, which covers practically the whole eastern slope of the Rocky Mountains.

The principal reason for the establishment of a forest reserve is because the area as a whole is more useful for growing a forest crop than for any other purpose. This often means that the area as a whole is fit for no other purpose.

It cannot be emphasized too strongly that a forest reserve does not reserve land from use—does not lock up its resources. It neither prevents nor retards the use of agricultural and grazing land, coal, oil, and mineral land, and timber situated within the area reserved. Camping, hunting, and fishing may be enjoyed just as freely as elsewhere.

In addition to forest reserves of which the Elk River is so far the only example, there is another class of forest land which is automatically reserved by Statute if it is known to be statutory timber land—i.e., land east of the Cascade Mountains bearing over 5,000 feet B.M. per acre, and land west of the Cascade Mountains bearing over 8,000 feet B.M. per acre. Altogether over 1,000,000 acres of such land has been examined and reported on by officers of the Forest Branch and reserved to the Crown. This total is made up of parcels of timber land of all sizes scattered over the Province.

Such a form of reservation differs from a forest reserve proper, in that the basis of it is the stand of merchantable timber existing on the land rather than consideration of what the land itself is permanently most useful for. In other words, it is the timber wealth which is reserved rather than the land itself. After the timber is sold and removed the land may be devoted to whatever purpose it is best suited. Thus such a reservation may and does include some land suitable for agriculture, when cleared, as well as land which will be of use only for the production of timber-crops.

The advantages of locating and reserving this timber are many and are obvious. In the first place, it gives definite information of where the valuable Crown timber is situated, so that arrangements can be made to protect the timber from fire and from trespass, and the land from accidental alienation. It guarantees that when the timber is sold the public treasury will receive full value for it.

It does not retard settlement. As a rule, where there are large areas of agricultural land, especially in the interior of the Province, the proportion of the area which is statutory timber land is not great; much or most of the land has been burned over one or more times, and bears a cover of reproduction more or less dense. The lightly wooded land will naturally be cleared

The class of land from which timber has been cut is shown by the following table. In view of the different rates of royalty paid and the different conditions to which the timber is subject, the table is of some interest. The large quantity cut from lands Crown-granted after 1887 shows the necessity of the land-examination work carried on by the Forest Branch in co-operation with the Lands Department to prevent the alienation of timber land. The table shows that, in 1914, 25 per cent. of cut timber came from land granted before 1887; 23 per cent. from land subsequently granted; 14 per cent. from pre-emptions; 24 per cent. from timber licences; 20 per cent. from timber leases; and 4 per cent. from timber sales.

SOURCES OF CUT TIMBER, 1914.

Forest District.	Crown Grants prior to April 7th, 1887.			Crown Grants subsequent to April 7th, 1887.			Pre-emptions.			Timber Licence.			Timber Lease.			Timber Sale.			Totals.		
	M. B. M.	Lineal Feet Thousands.	Cords.	M. B. M.	Lineal Feet Thousands.	Cords.	M. B. M.	Lineal Feet Thousands.	Cords.	M. B. M.	Lineal Feet Thousands.	Cords.	M. B. M.	Lineal Feet Thousands.	Cords.	M. B. M.	Lineal Feet Thousands.	Cords.	M. B. M.	Lineal Feet Thousands.	Cords.
Cranbrook		10		56,000	300	31,000	600	12	1,400	25,000	391	27,200	12,100	175	3,000	3,700	102	500	97,400	990	63,750
Fort George				1,452	64	1,050	3,900	180	4,680	2,000						548			7,900	244	5,680
Hazelton				1,500	108	2,000			250	800									2,300	108	2,250
Kamloops	5,500			7,500		200	3,000	200	2,400	3,100	1.1						2.9		19,100	204	2,600
Lillooet							1,807	215	578	40	8	12	25			708		450	2,800	223	1,010
Nelson				20,100	600	17,000	1,100	11.5	1,000	5,100	695	4,100	300		4,100	380	7.5		35,080	1,114	22,200
Vernon	800	3		2,300			10,800	281	8,600	4,000									17,900	284	8,600
Island	80,000	200	13,900	20,100	140	3,000	95	2.5		12,105			16,000	1.5					128,300	353	16,900
Prince Rupert	140		25	600	35.5	550	2		75	8,300	66	2,050	140	0.5	200	800	14		10,102	116	2,900
Vancouver	109,000	350	30,900	73,000	820	62,000	10,000	23	964	124,000	330	4,900	129,000	210	700	25,000		870	470,000	1,733	98,800
Totals—																					
M.B.M.	195,440			191,612			31,404			185,105			157,565			31,736			701,842		
Lin. Feet Th'ds.		563			1,876.5			985			1,491.1			387			120.4			5,429	
Cords			44,725			113,350			10,347			37,202			8,050			1,346			224,080

Timber Scaled (by Months and Districts).

		Cranbrook.	Fort George.	Hazelton.	Kamloops.	Lillooet.	Nelson.	Vernon.	Island.	Prince Rupert.	Vancouver.	Total M.B.M.	Total Lineal Feet, Ties.	Total Cords.	Total Ties.
January	logs M.B.M.	5,258	545	205	1,857	338	1,474	1,298	23,630	115	20,159	53,915			
"	lineal ft., thds.	75	49		42	36	86	3	66	6	213		570		
"	cords	4,104	771		254	119	3,720	208	13,984	59	28,940			52,255	
"	ties	37,728	1,546		5,910	752	8,370	11,744			10,330		7		76,355
February	logs M.B.M.	5,209	545	217	1,857	338	85	1,298	23,388	115	19,303	52,385			
"	lineal ft., thds.	102	49		42	36	19	3	30	6	230		436		
"	cords	3,080	771	727	254	119	1,619	208	2,931	59	9,068			19,455	
"	ties	54,216	1,546		5,910	752	34,077	11,744			2,240				110,454
March	logs M.B.M.	5,063	545	221	1,857	338	1,964	1,298	4,149	115	29,093	44,675			
"	lineal ft., thds.	72	49		42	36	118	3	19	6	36		384		
"	cords	4,031	771	183	254	119	812	208		59	6,249			12,706	
"	ties	24,457	1,546		5,910	752	77,706	11,744			2,976				124,089
April	logs M.B.M.	8,352	545	372	1,857	338	2,887	1,298	6,479	114	28,302	50,605			
"	lineal ft., thds.	274	49	63	42	36	45	1	17	6	276		815		
"	cords	3,011	771	1,567	254	119	1,040	208			9,780			17,426	
"	ties	82,610	1,546		5,910	752	39,604	11,744							142,105
May	logs M.B.M.	16,497	545	40	1,857	338	5,494	1,298	10,491	114	50,632	87,686			
"	lineal ft., thds.	131	49		42	36	72	4	70	6	184		540		
"	cords	4,298	771		254	119	1,530	208	748	59	6,303			14,290	
"	ties	118,304	1,546		5,910	752	23,157	11,744			13,344				189,549
June	logs M.B.M.	24,220	1,145	449	136	338	6,892	3,303	13,673	780	53,761	105,309			
"	lineal ft., thds.	50		16	27	36	205	35	14	30	171		650		
"	cords	4,222	200		1,000	119	258	87	784	1,031	3,479			11,156	
"	ties	133,667			14,400	752	47,038	39,870			9,758				253,685
July	logs M.B.M.	12,411	1,043	70	4,393	338	10,113	4,680	9,923	545	55,830	98,717			
"	lineal ft., thds.	49				2	72	28	31	18	273		474		
"	cords	3,802	670		34	7	3,227	166	8,462	274	8,691			25,933	
"	ties	151,871			8,250		10,248	4,128	78,816		14,240				273,853
August	logs M.B.M.	7,721	108	120	3,681	385	4,709	1,140	7,182	1,160	55,915	81,309			
"	lineal ft., thds.	8		12	1		64	61	39	7	267		461		
"	cords	2,330				7	443	65	67	566	5,665			9,149	
"	ties	83,602					16,547	4,548			8,736				113,373
September	logs M.B.M.	4,026	287	120	901	108	499	1,455	11,588	878	58,033	78,393			
"	lineal ft., thds.	30		12		3	107	25		5	172		352		
"	cords	1,936	276			21	186	44	686	273	2,080			5,632	
"	ties	81,803				1,647	12,579	3,428			60,504				160,061
October	logs M.B.M.	6,050		120			1,882	214	2,034	5,098	42,020	57,384			
"	lineal ft., thds.	32		3	6				11	15	210		277		
"	cords	2,149				74	183	70	2,250	765	5,851			13,380	
"	ties	7,931						4,054			2,080				14,065
November	logs M.B.M.	1,145		307			1,821	277	7,736	930	25,988	37,304			
"	lineal ft., thds.			26	2		11	117	52	7	121		336		
"	cords	394			45	66	3,980	650	1,318	182	3,330			10,254	
"	ties	650					3,433								4,083
December	logs M.B.M.	1,020	2,544	70			1,327	31	3,423	348	31,198	39,961			
"	lineal ft., thds.	102					325	1		4	5		497		
"	cords	3,912	381			56	1,127	1,738	540		7,071			14,053	
"	ties	8,862	1,152				550		1,569		4,400				16,464
Logs M.B.M.		97,473	7,942	2,291	18,538	4,760	37,767	17,655	123,753	10,288	408,560	787,102			
Lineal feet, thousands		901	245	172	246	221	1,124	284	395	122	2,128		6,854		
Cords		36,534	5,782	2,437	2,349	941	18,717	3,456	31,770	3,667	97,576			202,778	
Ties		701,441	8,882		52,290	6,159	286,959	114,913	80,316		137,578				1,477,514

Total board-feet, 306,969,800.

and settled first. The reserved timber lands will not only provide lumber for settlement and for export, but also will provide a source of employment for settlers and a market for their produce. Finally, after the land is logged, if it is suitable for agriculture, it is then opened for settlement and is the easier to clear because logged off; if it is fit only for growing timber, it can be kept in reserve for that purpose, or perhaps ultimately placed in permanent forest reserve.

FOREST-PROTECTION.

The weather during the fire season of 1914 was exceptional, the general opinion among Fire Wardens and lumbermen being that the conditions for bad fires were even more serious than they were in 1910, when a number of lives and much property and timber was lost. It was to meet just such conditions, however, that the Government established a forest protective force, and the season therefore provided a thorough test of the value of this force. Everything considered, the record for the past season can be looked upon as very satisfactory, and as fully justifying both the advanced position British Columbia has taken in forest-protection. Compared, however, with the value of the protected timber and the extreme importance of the forest resource to the future of the Province, the cost of fire-protection is small.

Despite the good general record, the season's experience brought out a number of weak points in the protection system. The more important of these points are as follows:—

(1.) Owing to the large size of the individual districts the force of regular Fire Wardens cannot handle the situation in a bad season. Whenever the danger becomes great several patrolmen are needed to assist each regular Fire Warden.

(2.) A reserve corps of efficient and experienced foremen to take charge of fire-fighting crews must be selected, and made available for duty upon immediate notice.

(3.) Plans for mobilizing, transporting, and feeding fighting crews must be improved.

(4.) Facilities for transportation and communication in the mountains away from settlement are inadequate. Thousands of miles of trail and hundreds of miles of telephone-line must be built before the fire-danger in such districts can be controlled.

Plans to overcome these defects are already under way, but staff increase and trail and telephone construction are, of course, limited by the funds available.

THE WEATHER RECORD.

Particularly in the Fraser Valley and the Fort George District the month of May was very dry and hot, and numerous fires occurred, some of them doing considerable damage. June was normal on the Coast and in the northern districts, but dry and hot in Cranbrook, Nelson, Vernon, and Kamloops. During July and August and the first week of September the weather was abnormally hot and dry throughout the whole southern part of the Province, the mean temperature being 2 degrees above normal and the total precipitation 2½ inches below normal. This long-continued excessive heat and marked drought created conditions extremely favourable to fires. On Vancouver Island and the Coast, fortunately, there were few winds and an entire absence of the dreaded dry east wind. In the Southern Interior, however, strong winds were of frequent occurrence, and in some districts blew for days at a time. There also occurred in this region a number of electric storms, which were not accompanied by any considerable amount of rainfall, and a very large number of fires were started by lightning in remote localities. As a result of these weather conditions the vegetation dried up early, and from July 25th to September 7th was in an extremely inflammable state, and fires, besides spreading with unbelievable rapidity, were almost impossible to put out. During this period of seven weeks the force in the Nelson, Cranbrook, Vernon, and Kamloops Districts, and to a lesser extent that in the Island and Vancouver Districts, was engaged almost night and day in fire-fighting.

In the Prince Rupert, Hazelton, Fort George, and Tete Jaune Districts the rainfall was above the normal in June and July, but deficient in August and September. Towards the end of August the conditions in the Fort George District became serious, and a number of fires escaped control, the worst ones being in the Peace River District, but the cool nights in September effectually checked their extension. In the other three districts there was very little trouble.

Below are tables, kindly prepared by F. Napier Denison, Superintendent of the Meteorological Observatory, Victoria, giving the weather records for the summer months at representative stations, which show in detail the unusual nature of the season.

TEMPERATURE AND RAINFALL DATA, 1914.

Station.	Temperature.		Rainfall.		
	Mean.	Difference from Average.	Rainfall.	Difference from Average.	No. Days Rain fell.
May, 1914.					
Nanaimo	57.0	+3.6	0.16	—1.84	5
Vancouver	56.4	+2.6	0.74	—2.60	6
Chilliwack	54.8	—0.4	1.97	—1.72	11
Kamloops	58.0	+0.6	1.31	+0.33	5
Revelstoke	53.5	+1.5	1.25	—0.97	14
Vernon	55.5	+1.0	1.07	—0.21	7
Nelson	55.1	+1.3	1.95	—0.21	9
Quesnel	52.1	+0.6	1.21	+0.31	5
Barkerville	43.1	—1.3	3.22	+0.80	13
Stuart Lake	43.6	—0.1	0.43	+0.62	6
June, 1914.					
Nanaimo	58.8	+1.1	1.70	—0.74	9
Vancouver	58.7	+1.0	3.58	+0.77	9
Chilliwack	58.3	—1.1	3.14	...	11
Kamloops	63.9	—0.1	0.54	—0.80	10
Revelstoke	58.6	+0.2	2.53	—0.52	12
Vernon	61.2	+0.6	1.05	—0.71	14
Nelson	58.5	—0.9	2.56	—0.26	15
Quesnel	59.7	+1.6	2.37	+0.69	9
Barkerville	50.4	...	4.39	+0.85	20
Stuart Lake	54.6	+0.9	1.10	—0.39	7
July, 1914.					
Nanaimo	64.4	1.2	0.10	0.62	3
Vancouver	63.5	+0.5	0.42	—0.91	4
Chilliwack	63.2	—0.8	0.17	—1.78	5
Kamloops	70.9	+2.5	0.53	—0.71	5
Revelstoke	65.1	+2.0	0.97	—1.53	4
Vernon	68.6	+1.7	0.62	—0.64	4
Nelson	68.8	+2.6	1.05	—0.88	5
Quesnel	58.0	—4.0	2.76	+1.10	10
Barkerville	52.1	—2.3	4.69	+1.54	17
Stuart Lake	55.1	+0.5	2.75	+1.42	18
August, 1914.					
Nanaimo	63.7	+1.0	0.33	—0.45	4
Vancouver	61.8	+0.3	0.75	—0.90	4
Chilliwack	61.7	—0.8	0.45	—1.77	4
Kamloops	68.7	+1.0	0.38	—0.65	4
Revelstoke	62.4	+1.0	1.19	—1.47	3
Vernon	67.1	+1.5	0.53	—0.48	4
Nelson	68.6	+5.0	0.24	—0.84	2
Quesnel	61.7	+1.4	0.30	—1.40	2
Barkerville	51.9	—1.6	0.96	—2.27	8
Stuart Lake	58.1	+4.5	0.32	—0.98	6
September, 1914.					
Nanaimo	54.7	—1.4	4.03	+1.73	17
Vancouver	54.8	—0.8	6.86	+2.39	17
Chilliwack	54.7	—2.2	6.35	+3.72	17
Kamloops	56.5	+0.9	1.09	+0.14	11
Revelstoke	52.7	—0.2	3.87	+0.48	18
Vernon	55.1	+0.1	1.96	+0.55	15
Nelson	53.1	—2.6	3.44	+1.53	13
Quesnel	52.4	+0.6	1.39	—0.35	8
Barkerville	43.8	+0.7	3.75	+0.11	16
Stuart Lake	47.2	+2.2	1.00	—0.37	12

CO-OPERATION.

In a forest Province such as British Columbia the prevention and suppression of fires is of universal concern and importance. Every interest, private, corporate, municipal, Provincial, and Federal, is affected in some way, and mutual assistance and co-operation is necessary if the efforts at fire-protection are to be effective. It is safe to say that in no other Province or State is there a more active interest taken or more help given by the public in fire-protection matters than in British Columbia.

The Forest Branch much appreciates the helpful attitude of farmers and settlers, who, besides conforming cheerfully to permit regulations, have assisted the field officers by reporting fires and by helping to fight fire at times when they could ill afford to leave their work. The lumber, mining, irrigation, and transportation companies have likewise been of very greatest assistance, and in a number of cases have employed patrolmen of their own. An incomplete list of firms who do this is as follows:—

NAMES OF TIMBER-OWNERS, IRRIGATION AND MINING COMPANIES EMPLOYING MEN FOR FIRE-PATROL WORK.

Forest District.	Name of Firm.	No. of Patrol-men.	Region patrolled.
Island	Cowichan Lumber Co.	2	Cowichan Lake.
"	V. H. May	1	Campbell River.
"	British American Timber Co.	2	"
Vancouver	Merrill & Ring	2	Mamquam Valley.
"	Lacy Timber Co.	2	Salmon River.
"	North Pacific Lumber Co.	1	Chilliwack River.
Vernon	B.C. Copper Co.	1	Upper Similkameen.
"	Nicola Valley Pine Co.	1	Coldwater River.
"	Belgo-Canadian Irrigation Co.	2	Mission Creek.
"	Coalmont Collieries	1	Hedley Mountain.
"	Penticton Lumber Co.	1	Naramata.
Nelson	Munson Lumber Co.	1	Blueberry Creek.
"	Mankin Lumber and Pole Co.	1	Salmon River.
"	E. R. C. Clarkson	1	"
"	Traders' National Bank	1	"
"	Western Pine Lumber Co.	1	North Fork, Kettle River.
"	Western Canada Timber Co.	1	Lardeau River.
"	British Canadian Lumber Co.	1	Slocan River.
"	Kootenay Cedar Co.	1	Lardeau River.
"	Royal Lumber Co.	1	Duncan River.
Cranbrook	C.P.R. Forestry Branch	7	C.P.R. Tie Reserves.
Fort George	Grain-growers' Grain Co.	1	South Fork, Fraser River.

Mr. Napier Denison, of the Dominion Weather Service, very kindly furnished special forecasts of wind and heat conditions which proved of great assistance.

As in previous years, the Public Works Department and the Provincial Police gave every assistance in their power.

The mutually advantageous agreement with the Dominion Forestry Branch, under which the Wardens of both services co-operated in handling fires along the boundary of the Railway Belt, and by which the Dominion Wardens received authority to grant burning permits in the Belt, was continued.

EDUCATION.

In a Province so dependent on forest industries as British Columbia the importance of protecting the forests from fire must be kept before the public constantly. This can best be done by following the recognized principles of advertising. Last spring, therefore, besides posting along roads, at logging camps, and other convenient places notices bearing information about the fire law, the attention of the public was sought by the distribution of art pictures carrying their own story of fire-protection, attractive and striking calendar posters, pocket

whetstones bearing appropriate inscription, and coloured slides which the proprietors of moving-picture theatres generously agreed to show.

The wisdom of these modern methods of education was shown by the many favourable comments that were made upon the attractive and useful articles used to present the educational matter. The effectiveness of such methods are, of course, dependent on the mental impression made by the article and its association with the warning of information contained in the subject-matter.

The assistance and co-operation received from the public in fire-protection matters, the manner in which the regulations in regard to setting out and clearing camp-fires were carried out, and the general interest which all classes of people take in fire-protection is effective evidence of the value of such an educational campaign.

FIRE-PATROL FORCE.

Through various economies and by shortening the period of employment it was possible to employ 190 regular Forest Guards in 1914 against 159 the previous year, and 115 extra patrolmen and look-out men for short periods against 65 in 1913, at an increased expense of only a few thousand dollars, the figures for patrol being $206,000 and $214,000 respectively for 1913 and 1914. This increase in force permitted a reduction in the size of the patrol districts and was largely responsible for the good record of the past season. The important part which the size of the patrol districts plays in forest-protection is indicated by the fact that the timber-owners' protective associations of the North-western States and Eastern Provinces consider 50,000 acres the largest area one man can patrol efficiently. In British Columbia in 1914 the average district covered 500,000 acres, while in 1913 the area was 670,000 acres. The great difference between the size of patrol districts in British Columbia and other forest regions is, however, partly offset by the lower hazard in this Province, due to sparser settlement and the existence of large forest areas at high altitudes where the dangerous season is of short duration. Moreover, by reference to the table given in the Organization section it will be seen that in the southern districts, where the hazard is greatest, the districts are comparatively small.

The efficiency of patrol was also increased by improving the means of travel of the Guards, a much larger number of horses and motor-boats being used than in preceding years. Detachable low-priced motors for canoes were found to be very effective for patrol on the inland lakes.

Owing to the immense size of the Rangers' districts a more rapid means of travel than that provided by horses is very badly needed, and in districts well supplied with good roads cheap motor-cars would greatly facilitate the supervision of the work of the Guards by the Rangers. This is of the highest importance in a bad fire season, where poor judgment on the part of an inexperienced Guard may result in the unnecessary expenditure of thousands of dollars. The only possible way of preventing such waste is through close supervision on the part of the Rangers.

It is a pleasure to say that the work of the individual Guards and patrolmen showed marked improvement this year, due partly to the close supervision by the District Foresters and Rangers, but largely to the active interest taken in the work by the men themselves. A careful record is kept of the work of each Guard, and those who prove their ability are given appointments the following year. In this way the personnel of the force becomes better each year, and eventually the Province will have a corps of thoroughly trained men, competent to handle big fires effectively and economically, as well as to perform the ordinary duties, such as patrol and the issuance of burning permits.

Each spring finds most of the trails through the timber rendered impassable by fallen logs and brush broken down by snow. Then there are many abandoned trails which need to be opened up. It is the duty of the Guards to clear out these trails so far as their other duties permit. Even in 1914 they were able to clear out 245 miles.

TABLE B.—DAMAGE TO PROPERTY OTHER THAN FORESTS.

Forest Districts.	Forest Products in Process of Manufacture.	Buildings.	Railway and Logging Equipment.	Miscellaneous.	Totals.	Per Cent.
Cranbrook	$ 68,100	$ 2,000	$ 1,100	$ 125	$ 71,325	19.6
Fort George	160	275	...	505	940	0.3
Hazelton	408	1,200	...	3,025	4,723	1.3
Island	13,805	123,070	1,000	325	138,200	37.9
Kamloops	385	945	370	200	2,100	0.6
Lillooet	...	900	...	600	1,500	0.4
Nelson	114,445	1,000	...	7,275	122,720	33.6
Prince Rupert	...	...	...	...	...	...
Tete Jaune	...	...	...	...	...	...
Vancouver	3,740	7,585	8,400	1,775	21,500	5.9
Vernon	540	620	...	247	1,407	0.4
Totals	$201,733	$137,595	$11,070	$14,077	$364,475	100.0
Per cent.	55.3	37.7	3.0	4.0	100.0	...

TABLE C.—A COMPARISON OF THE DAMAGE CAUSED BY FOREST FIRES DURING THE PAST FIVE YEARS.

	1910.	1911.	1912.	1913.	1914.
Total number of fires	1,184	331	347	578	1,832
Total area burned-over (acres)	218,388	Not given.	160,000	10,270	355,124
Standing timber destroyed or damaged (M. ft. B.M.)	130,650	3,570	200,000	3,845	102,804
Damage to forest	$193,976	Not given.	$200,000	$ 4,387 00	$ 72,057
Damage to other forms of property	435,939	47,000	113,273	13,967 25	364,475
Total damage	629,915	...	313,273	18,354 00	436,532

NOTES.—Damage to forest in 1910, 1911, and 1912 includes only estimated valuation of damage to timber; in 1913 and 1914 it includes also estimated damage to valuable reproduction; 1910 was a very hazardous fire season (seven lives were lost through forest fires); 1911 season favourable on the Coast, dry in the Northern Interior; 1912 season dry and hazardous in spring; 1913 season very favourable; 1914 season in southern districts worst in many years; in northern districts normal.

DAMAGE TO FOREST.

Though in southern British Columbia the past fire season was said to be the driest and most hazardous for twenty years, the damage caused was relatively light. While the number of fires is much greater than in any previous year, the area and quantity of standing timber damaged or destroyed is less than in both 1910 and 1912. Only about 12 per cent. of the total area burned bore merchantable timber, and a considerable part of the timber can be salvaged within the next few years.*

Valuable second growth burned comprised about 16 per cent. of the total area and about a quarter of the total damage to the forest. Over half the total area burned over was land which bore very little merchantable timber or valuable second growth. It includes logged-off land; areas of unmerchantable though mature timber; and areas which were burned off in former years and on which little or no reproduction of forest takes place. Some of it is agricultural land and will eventually be used for that purpose. Some of it is unfit for farming, but capable of bearing merchantable timber; and in this case the fire has seriously delayed the future timber-crop. Again, some of the burned over is unfit either for agriculture or for

* It should be stated that three large fires were reported on the watershed of South Pine River—a tributary of the Peace—this summer, but since reliable estimates as to the area burned over and timber killed could not be obtained, they are not included in the fire statistics.

growing merchantable timber, its chief value being for watershed protection. Where large areas are severely burned and the forest cover destroyed, the damage manifests itself in floods, soil-erosion, and the choking-up of streams.

Nearly 16 per cent. of the total area burned over was grazing land either open or only lightly timbered.

DAMAGE TO OTHER FORMS OF PROPERTY.

Over half the total damage listed in this table is made up of two items. In the Island District the destruction of the town of South Wellington by a forest fire, believed to be of incendiary origin, is responsible for $120,000 out of the $123,070 damage to buildings. In Nelson District the value of a sawmill and lumber destroyed by a forest fire makes up most of the $114,445 listed in the column headed "Forest Products in Process of Manufacture."

COST OF FIGHTING FIRES, 1914.

FIRES, 1914, CLASSIFIED BY PLACE OF ORIGIN AND COST OF FIGHTING.

Forest District.	Total Fires.	Originated on Crown Lands and Alienated Timber Lands.*	Originated on Alienated Lands not classified as Timber Lands.†	Extinguished without Cost.			Cost Money to fight.			Total Cost fighting Fires.		Average Cost per Fire.	
				No.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in this Class.	No.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in this Class.	Dollars.	Per Cent.	Dollars.	Per Cent.
	No.	No.	No.										
Cranbrook	240	30	210	169	68.7	14.5	77	31.2	12.0	22,383	16.0	291	13.3
Fort George	299	201	100	209	69.9	22.7	93	30.0	9.7	5,442	3.9	59	2.7
Hazelton	105	35	68	71	68.9	5.9	32	31.1	5.0	1,276	0.9	40	1.8
Island	120	...	120	45	37.5	3.8	75	62.5	11.8	10,760	7.7	143	6.5
Kamloops	146	78	68	95	65.0	7.9	51	35.0	8.0	20,396	14.5	397	18.1
Lillooet	40	35	14	42	85.7	3.5	7	14.3	1.1	127	0.1	18	.8
Nelson	418	87	331	267	63.9	22.4	151	36.1	23.6	46,515	33.2	308	14.0
Prince Rupert	8	4	4	5	62.5	0.4	3	37.5	0.5	427	0.3	142	6.5
Tete Jaune	81	14	67	68	84.0	5.7	13	16.0	2.0	328	0.2	25	1.1
Vancouver	140	78	62	68	48.6	5.7	72	51.4	11.3	12,051	8.6	167	7.6
Vernon	198	88	110	101	51.0	8.5	97	49.0	15.2	24,142	16.5	241	11.0
Totals	1,832	560	1,233	1,195	100.0	100.0	639	.....	100.0	140,107	100.0	219	10.0
Per cent. of totals	100	32.7	67.3	65.1	.....	.....	34.9	.....	.....	.....	.....	.....	.....
1913 totals	576	.....	.....	420	.....	.....	156	.....	.....	5,929	.....	80	.....
Per cent.	100	.....	.....	73	.....	.....	27	.....	.....	.....	.....	.....	.....
1912 totals	347	.....	.....	113	.....	.....	234	.....	.....	29,879	.....	128	.....
Per cent.	100	.....	.....	33	.....	.....	67	.....	.....	.....	.....	.....	.....
1911 totals	331	.....	.....	199	.....	.....	132	.....	.....	14,344	.....	109	.....
Per cent.	100	.....	.....	60	.....	.....	40	.....	.....	.....	.....	.....	.....
1910 totals	1,184	.....	.....	615	.....	.....	569	.....	.....	140,000 (approx)	.....	246	.....
Per cent.	100	.....	.....	52	.....	.....	48	.....	.....	.....	.....	.....	.....

* Includes timber licences, timber and pulp leases, Crown-granted timber land, tie reserves, etc.

† Includes pre-emptions, purchased land, various forms of leases, as coal, grazing, etc., mineral claims, and some Dominion Government land, as Indian reserves.

The total cost this year is the greatest since 1910, for the fire season was the worst in many years. Judged by the value of timber and other property protected, however, the sums expended represent only a small insurance premium. Compared with the much greater expense incurred under similar conditions in the Western United States in 1914, the cost is moderate.

The number of fires which cost money to fight is greatest in the southern districts, where the hazard is most serious. In Kamloops District nearly half the total cost of fighting fires was incurred in one very bad fire. In Prince Rupert District the number of fires was small, and nearly the total expense was incurred in fighting two fires, one of which was set by lightning in a situation very difficult to reach.

FIRES, 1914, CLASSIFIED BY SIZE.

Forest District.	Total Fires.	Under ¼ Acre.			¼ Acre to 10 Acres.			Over 10 Acres.					
		No.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in this Class.	No.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in this Class.	No.	Per Cent. of Total Fires in District.	Per Cent. of Total Fires in this Class.	Damage under $100.	Damage $100 to $1,000.	Damage over $1,000.
	No.										No.	No.	No.
Cranbrook	246	110	44.4	18.1	77	31.3	12.7	50	20.3	8.8	45	2	3
Fort George	323	115	35.6	17.2	125	39.0	20.8	82	25.4	14.4	58	17	7
Hazelton	103	19	18.4	2.8	34	33.0	5.6	50	48.5	8.8	45	4	1
Island	120	10	8.3	1.5	54	45.0	8.9	56	46.7	9.8	30	24	2
Kamloops	146	70	52.0	11.6	28	19.2	4.6	42	28.8	7.4	22	13	7
Lillooet	49	20	40.8	3.0	19	38.8	3.1	10	20.4	1.8	7	3	.....
Nelson	418	130	31.1	19.8	130	38.0	25.2	129	30.9	22.7	110	17	2
Prince Rupert	8	.....	.....	.....	6	75.0	1.0	2	25.0	0.3	2	.....	.....
Tete Jaune	81	57	70.4	8.7	16	19.7	2.6	8	9.9	1.4	5	3	.....
Vancouver	140	48	34.3	7.3	31	22.1	5.1	61	43.6	10.7	44	14	3
Vernon	198	63	31.8	9.6	56	28.3	9.3	79	39.8	13.9	69	12	7
Totals	1,832	657	.....	100.0	606	.....	100.0	569	.....	100.0	428	109	32
Per cent. of totals	100	35.9	...	.....	33.1	...	.....	31.0	.....	.....	75.2	19.1	5.7
1913 totals	578	299	.....	.....	200	.....	.....	79	.....	.....	.....	.....	.....
Per cent.	100	51.7	.....	.....	34.6	.....	.....	13.7	.....	.....	.....	.....	.....

SIZES OF FIRES, 1914.

In a very dry season fires spread more rapidly than in a normal year. The result is a greater proportion of large fires. The dangerous weather conditions of 1914 are shown by the fact that only a little over one-third of the fires in 1914 were extinguished while still very small, as against over half in 1913; and nearly one-third of the fires of 1914 reached formidable sizes before being controlled, as against about one-seventh of those in 1913.

CAUSES OF FOREST FIRES, 1914.

TABLE A.—NUMBER AND CAUSES OF FIRES, 1914.

Forest District.	(1.) Campers and travellers.	(2.) Unknown Causes.	(3.) Operation of Railways.	(4.) Lightning.	(5.) Brush burning.	(6.) Railway construction.	(7.) Miscellaneous.	(8.) Industrial Operations.	(9.) Incendiary.	(10.) Public Road-construction.	Totals.	
											No.	Per Cent.
Cranbrook	31	79	97	9	5	1	..	11	13	..	246	13.4
Fort George	185	38	2	7	29	54	1	1	4	2	323	17.6
Hazelton	34	25	1	1	32	1	6	..	2	1	103	5.7
Island	34	31	2	...	23	1	11	13	4	1	120	6.6
Kamloops	34	18	9	50	11	9	10	..	4	1	146	8.0
Lillooet	23	14	...	...	2	2	6		..	2	49	2.7
Nelson	31	50	206	70	32	..	13	1	4	2	418	22.8
Prince Rupert	3	1	...	1	3	..	..	..	..	..	8	0.4
Tete Jaune	28	6	25	5	1	15	1	..	..	..	81	4.4
Vancouver	27	47	9	...	16	8	11	21	..	1	140	7.6
Vernon	57	58	10	17	10	7	24	3	11	1	198	10.8
Totals	487	367	361	169	164	98	83	50	42	11	1,832	100.0
Per cent.	26.6	20.0	19.7	9.2	9.0	5.3	4.5	2.8	2.3	0.6	100	...

NOTES ON CAUSES.—(1.) Includes prospectors, hunters, fishermen, picnickers, smokers, floating labourers, hoboes, etc. (2.) Chiefly locomotives. (5.) Chiefly for clearing agricultural land; not for clearing railway rights-of-way. (6.) Right-of-way clearing, locomotives, steam-shovels, etc. (8.) Logging operations, donkey-engines, sawmills, etc. (10.) Also construction of power, telegraph, and telephone lines not connected with railways.

TABLE B.—NUMBER AND CAUSES OF FOREST FIRES FOR PAST FIVE YEARS.

Causes.	1914.	1913.	1912.	1911.	1910.
Campers and travellers (including smokers, Indians, prospectors, hunters, tramps, etc.)	487	195	51	126	188
Unknown	367	104	149	126	374
Operation of railways	361	110	34	31	272
Lightning	169	34	23	1	103
Brush-burning to clear farm land, etc.	164	26	47	14	184
Railway-construction	98	62	11	8	...
Miscellaneous	83	7	6	3	...
Industrial operations (as logging)	59	24	17	14	63
Incendiary	42	7	...	...	...
Public road-construction	11	9	9	8	...
Totals	1,832	578	347	331	1,184

It is an interesting fact that for the past five years the chief causes of forest fires have been almost the same each year, and altogether have been responsible for from 85 to 94 per cent. of the total number of fires. In the above Table C it is seen that "campers and travellers," "operation of railways," "unknown," "brush-burning," and "lightning" are largely responsible.

CAMPERS AND TRAVELLERS.

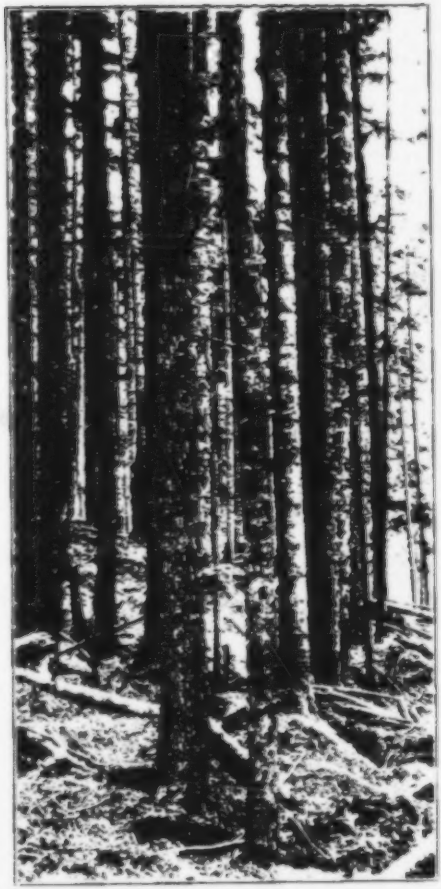
Over 90 per cent. of all forest fires in British Columbia are due to human agency of some kind, and therefore are preventable. Of all such fires, those known to be caused by campers and travellers are greater in number than those from any other single known cause, amounting to nearly 25 per cent. of all fires during the last five years. There is no doubt, too, that most of the "unknown" fires are due to campers and travellers. Of all causes, this then is the most prolific of fires; it is also the most unnecessary and the most irritating, for the reason is carelessness, ignorance, or laziness. All such fires are avoidable. They stand in a class by themselves. The operation of railways and brush-burning are regulated by special legislation which it is comparatively easy to enforce, because such matters are conspicuous and readily supervised. The regulations regarding railways and brush-burning, their enforcement and compliance by the companies and persons affected—all these are satisfactory.

Legislation aimed to control the setting and care of camp and smudge fires, and the disposal of burning tobacco, matches, etc., in the forest could not well be enforced. With an average patrol area of several hundred thousand acres, it is obviously impossible for the force to prevent destructive fires originating from such causes, though a great many are detected and extinguished before they become dangerous. It is just as obviously impossible to have a patrol force large enough to prevent all these fires. Nor should this be necessary, for every person in British Columbia has a stake in its forest wealth, directly or indirectly, and the public should itself help in the work. The lumbering industry pays half the wages in British Columbia in normal times. Everybody shares in that to some extent. Even greater than the present revenue derived from the forests, which is in normal times about one-quarter of the total Provincial revenue, is the future revenue which will result when the great areas of public forest, now immature or inaccessible to market, are utilized. Everybody should realize that a forest fire touches his own pocket as well as other people's pockets. But, apart from the personal pecuniary interest which every inhabitant of British Columbia has in the forest wealth, there are many other considerations which should make every one careful with fire in the woods. There is the destruction of game, the injury to watersheds and soil, and, most important of all, the destruction of life and property resulting from forest fires. The remedy lies largely in public education. Every effort is being made by the Forest Branch to educate the public to be more careful of fire in the woods, and to obtain its co-operation in the work of protecting the forest wealth of the Province.

UNKNOWN.

The percentage of fires of which the causes are unknown has decreased markedly in the past two years, previous to which it had been greater than any other class each year since 1910.

Fire set by lightning on North Thompson River on top of mountain, making fire-fighting difficult and expensive.



Pulp timber, hemlock and balsam, on Maquilla River, Vancouver Island.

Slash resulting from logging operations, a fire-trap which is bound to burn sooner or later, and should therefore be fired purposely when weather conditions are favourable.

This is because improved organization and a larger force have enabled more complete records to be obtained. There is no doubt that many of these "unknown" fires are due to campers and travellers. It is also probable that a number this year were of incendiary origin.

OPERATION OF RAILWAYS.

This comes third on the list of causes in 1914, and has varied from second to fourth since 1910. During the past few years a very large amount of new railway-line has been built and put under operation, and a great deal more will be put in operation next year. It might be expected, therefore, that the number of fires due to the operation of railways would have increased proportionately, and especially in a year of such great hazard as 1914. This, however, has not been the case. The percentage of railway fires is not excessive; it is practically the same as in 1913, a year of small hazard, and less than 1910, a year of great hazard. It should be remembered, too, that the great majority of the railroad fires reported are small and soon put out, and that much more complete records are now kept of railroad fires than was previously the case. An order of the Board of Railway Commissioners this year required the railways to report to the Board every fire occurring within 300 feet on each side of the right-of-way. On this account many small fires put out by the sectionmen and railway patrolmen before they had time to spread were reported, of which formerly no reports were obtained.

The good record this year is a tribute to the effectiveness of the regulations of the Dominion Board of Railway Commissioners and of the provisions of the "Forest Act," as well as to the satisfactory way in which railways on the whole complied with them.

Two districts, Nelson and Cranbrook, had 84 per cent. of these fires, and Nelson alone had nearly 60 per cent. Deducting them, the number of fires in the rest of the Province due to railway operation is trifling. Both those districts had in the parts where most of these railroad fires occurred somewhat similar conditions—viz., heavy railway-grades, and Dry Belt climate and vegetation, with its inflammable dead grass and shrubs in summer. Under the conditions existing in July, August, and the first week in September, practically every spark thrown out from the locomotive would start a fire. The locomotives were all equipped with spark-arresters, but it appeared that a certain number of live sparks will escape from any of the spark-arresters used, especially on heavy grades, where the engine is labouring under forced draught. To further aggravate all this, the Canadian Pacific Railway, which caused most of these fires, unfortunately used for a short period during the dry weather a kind of coal which sparks very freely. Its use was abandoned as soon as its danger was discovered, but not before a large number of fires had been set.

In the Vernon District, where the conditions as regards railway hazard were very similar to Nelson and Cranbrook, the number of railway fires is small. The reason is that oil-burning locomotives were used. The Canadian Pacific Railway used them all summer, and the Great Northern Railway, after the coal-burning locomotives set several expensive fires in August, replaced them with oil-burners.

LIGHTNING.

Lightning is the one absolutely unavoidable cause of forest fires. The number of lightning fires in any one year is a fairly good index of the hazard for that year. Referring to Table C, it is seen that both 1910 with 103 and 1914 with 169 lightning fires had an unusually large number of such fires. Both were years of great fire hazard.

Referring to Table A, it is seen that three districts of the Southern Interior, Vernon, Kamloops, and Nelson, and especially the latter two, are much more liable to lightning fires than the others. Over 85 per cent. of all such fires in 1914 occurred in those three districts, and nearly half of the total were in the Nelson District alone.

BRUSH-BURNING.

Brush-burning to clear land for agriculture, to burn logging-slash, etc., is always attended with a certain amount of risk, as is explained under the head of "Permits." However, it is both desirable and necessary, and therefore the risk must be taken whenever it is reasonably safe. The regulation of such burning by the permit law during the fire season reduces this risk to the minimum.

DAMAGE CAUSED BY FOREST FIRES, 1914.

TABLE A.—AREA BURNED OVER AND DAMAGE TO FORESTS.

Forest District.	Merchantable Timber destroyed or damaged.			Valuable Second Growth.			Cut-over Land, Unmerchantable Timber, Old Burn not restocking, etc.			Grazing Range.	Grand Totals.					
	Area.	Quantity.	Damage.	Area.	Quantity.	Damage.	Area.	Quantity.	Damage.	Area.	Area.		Quantity.		Damage.	
	Acres.	M. Ft. B.M.		Acres.	M. Ft. B.M.		Acres.	M. Ft. B.M.		Acres.	Acres.	Per Cent.	M. Ft. B.M.	Per Cent.		Per Cent.
Cranbrook	3,041	11,397	$ 1,385	4,460	30	$ 2,445	13,901	7	.....	13,579	35,881	10.1	11,434	9.7	$ 3,820	5.3
Fort George	2,338	10,358	4,000	5,666	.....	5,666	27,033	.....	.....	10,876	45,913	13.0	10,358	8.7	9,666	13.4
Hazelton	33	97	97	3,542	.....	3,542	16,373	.....	.....	370	20,318	5.7	97	0.1	3,639	5.1
Island	2,820	20,000	2,000	1,704	900	448	34,002	.....	.....	1,072	39,594	11.2	20,900	17.5	2,448	3.4
Kamloops	1,597	9,279	6,154	4,775	26	5,465	7,895	3,500	$350	1,495	15,762	4.4	12,805	10.8	11,969	16.6
Lillooet	.....	.....	.....	355	.....	.....	423	.....	.....	1,126	1,904	0.6	.....	.....	.....	.....
Nelson	8,295	24,472	12,236	14,147	.....	.....	35,498	.....	.....	13,947	71,857	20.2	24,472	20.7	12,236	17.0
Prince Rupert	.....	.....	.....	2,072	.....	.....	10,913	.....	.....	.....	12,985	3.6	.....	.....	.....	.....
Tete Jaune	770	207	500	50	.....	.....	30	.....	.....	10	860	0.2	207	0.2	500	0.7
Vancouver	200	2,500	1,250	2,200	.....	.....	19,150	.....	.....	.....	21,550	6.1	2,500	2.1	1,250	1.7
Vernon	22,579	24,494	25,240	19,341	1,335	789	39,235	10,000	500	13,245	88,400	24.9	35,829	30.2	26,529	36.8
Totals	42,549	102,804	$52,852	58,402	2,291	$18,355	198,453	13,507	$850	55,720	355,124	100.0	118,032	100.0	$72,057	100.0
Per cent. of grand totals	12.0	86.7	73.3	16.4	1.9	25.5	55.9	11.4	1.2	15.7	100.0	.....	100.0	.....	100.0	.....

NOTE.—In some districts a large amount of the timber is salvable and not included in the loss valuation. Valuable second growth: Valuations not given by districts for which figures are lacking.

RAILWAY-CONSTRUCTION.

Considering the many uses of fire necessary in railway-construction for clearing right-of-way and other purposes, the great amount of this work done this summer, and the very dry weather, the small number of fires due to this work (92, or 5 per cent. of the total number of all fires) is noteworthy. Over half the total of these fires occurred in Fort George District, chiefly during late May, when an unusually dry period and high winds caused a number of fires burning right-of-way slash to get beyond control. At this time, too, the patrol force was smaller and the contractors less careful in burning than later in the season. The comparatively small total number of railway-construction fires shows the value of the policy adopted to prevent and control them—viz., maintaining a sufficient force of railway patrolmen to thoroughly patrol the right-of-way, and requiring the railroad company to burn under permit all right-of-way slash, to pile all dangerous slash lying adjacent to the right-of-way, and to fight at its own expense all fires resulting from construction-work.

INDUSTRIAL OPERATIONS.

The number of fires due to industrial operations—which means chiefly logging operations—is also gratifyingly small, being only fifty, or less than 3 per cent. of all fires. The location of these fires (Table A) shows where the greatest activity in logging operations occurs—viz., Vancouver Island, and Cranbrook Districts. These districts had 90 per cent. of the fires due to such causes.

The provision of the "Forest Act" which requires farmers, loggers, railway contractors, section foremen, and others to obtain a permit before setting out fires in May, June, July, August, and September is the most effective method so far discovered for the prevention of forest fires. In a timbered country such as British Columbia fire must be used everywhere to dispose of brush, slash, and refuse caused by agricultural, logging, railway, and other industrial operations. But in summer, and especially in a season as dry as the past one, almost every fire set out in a wooded region is dangerous and liable to escape control. The necessity for supervision over the setting of fires is therefore evident. Without it settlers, towns and villages, timber-owners, loggers, and others would be exposed to the constant menace of loss of life and property.

The enforcement of the permit law necessarily places something of a burden upon the farmer, since delay in obtaining a permit is sometimes unavoidable, and the conditions which must be imposed to ensure safe burning not infrequently mean added expense. Notwithstanding these objections, the public generally have cheerfully accepted and approved the regulations, and have arranged their plans for clearing land and burning brush accordingly, realizing that with all its disadvantages the law provides security against loss of life and property.

The policy adhered to by the Department has been to allow the greatest possible freedom for slash-burning in summer consistent with reasonable forest-protection. Instructions are issued by the District Foresters and also by the Rangers to the Guards through the season as required. The gist of the instructions is that permits should be issued without delay; that each area should be examined by the Guard, except in special cases; that the duration of the permit should be made as long as safety allows.

Personal examination was made of 95 per cent. of all areas for which permits were granted. The duration of permits varied from two to thirty days and averaged from seven to fifteen, being greatest in the early and late parts of the season.

In most of the southern districts, including the Island, Vancouver, Vernon, Nelson, Cranbrook, and Kamloops Districts, dry, dangerous weather, high winds, and numerous fires made it necessary to restrict or cancel permits in the latter part of July, all of August, and the first week of September. While this action no doubt worked individual hardship in a few cases, yet the public as a whole realized its necessity and willingly accepted it.

The value and effectiveness of the permit regulation is indicated by the fact that in 1914, the dryest and most hazardous summer in many years, only 128 permit fires escaped control, which is about 1 per cent. of the 11,523 fires set out under permit, and is about 7 per cent. of the 1,832 forest fires occurring in 1914.

That the fire season of 1914 was very much more hazardous than the two preceding ones is shown in a measure by the following comparison of the permit fires which escaped control in the respective seasons:—

1912.—Eight permit fires escaped control: less than $^1/_{10}$ of 1 per cent. of the 9,477 permits issued, and about 2 per cent. of the 347 forest fires.

1913.—Seventeen permit fires escaped control; less than $^2/_{10}$ of 1 per cent. of the 11,925 permits issued, and 3 per cent. of the 578 forest fires.

1914.—One hundred and twenty-eight permit fires escaped control; about 1 per cent. of the 11,523 permits issued, and 7 per cent. of the 1,832 forest fires.

It is instructive to note that many of the forest fires caused by escaped permit fires were due to sudden high winds which blew live sparks and embers considerable distances into the forest. For instance, in Kamloops District a man was burning a pile of stumps under permit in his orchard. A sudden wind sprang up, carried the fire 300 feet into the adjoining brush, and started a forest fire. This is one illustration of the many which could be given to show that in dry weather, when the forest is like tinder, there is hazard in almost any fire burning out-of-doors near standing timber, slashings, or any inflammable material, even under conditions apparently safe. It explains why it is necessary to restrict or cancel all permits in the extra-hazardous periods.

Only eighty, or about 4 per cent. of the total number of forest fires, were caused by persons burning brush without first obtaining a permit. Most of the prosecutions instituted by the Forest Branch were for these violations of the Act. Nothing is more certain than that had there been no permit regulation the results would have been disastrous in the extreme.

PERMITS FOR CLEARING AGRICULTURAL LAND.

About the same number of permits was issued in 1914 as in the previous year, but the total area burned over was nearly twice as large, the increase being practically all in permits for clearing agricultural land. This shows that advantage was taken of the dry weather and easy burning conditions by the settlers to clear land on a much larger scale than previously. It also indicates how much greater was the fire hazard and work of supervising burning in 1914 than 1913.

A comparison of the number of permits granted for clearing agricultural land and the area burned gives some idea of the relative progress of settlement in the different districts. It is greatest in the Island, Vancouver, Vernon, and Nelson Districts in the south, and in Hazelton and Fort George Districts in the north. Evidently the completion of the Grand Trunk Pacific Railway has greatly stimulated settlement in the latter two districts. In Hazelton in 1913 only 463 permits were issued for clearing agricultural land and about 500 acres burned, while in 1914 750 permits were issued and 8,950 acres burned. In Fort George in 1913 the number of permits for this purpose was 391 and the area burned 380 acres, while in 1914 the figures are 1,313 permits and 5,138 acres.

In Vancouver and the Island Districts in 1914 the permit law was modified by exempting all or parts of certain municipalities (which comprised chiefly settled agricultural lands in the valley of the Lower Fraser) for all or part of the fire season; while in other municipalities the administration of the permit law was turned over to the municipal officials. The municipalities affected were: Vancouver District—Burnaby, South Vancouver, Point Grey, Richmond, Delta, Surrey, Langley, Matsqui, Sumas, Chilliwack, Mission, Maple Ridge, Pitt Meadows, and Coquitlam. Island District—Saanich and Esquimalt.

This plan, of course, can only be adopted in settled regions where the land is largely cleared, and the forest therefore broken up into blocks with few or no large tracts of valuable timber left; in fact, where the agricultural interest outweighs that of the forest. It not only allows the settlers a freer hand in clearing up land, but also relieves the Forest Branch of the expense of patrol and supervision in such areas, and allows more attention to be given to the forest regions proper. The amount of work thus saved is shown by the fact that only 787 permits were required in the past year in Vancouver District, as against nearly 4,000 in the previous year. The decrease is due to the fact that the great bulk of the permits in 1913 were issued in those areas in the Fraser Valley lands mentioned above, where this year permits were either not required or were issued by municipal officers. The comparison gives further proof of the easier burning conditions, greater activity in burning, and greater fire hazard of 1914.

PERMITS FOR LOGGING-SLASH.

The area of logging-slash burnt over under permit (5,727 acres) is less than in 1913 (7,655 acres), though over twice as many such permits were issued. The chief reasons for this are that the very hazardous weather conditions made burning on a large scale unsafe for a long period in the summer, and, furthermore, the depressed condition of the lumber industry made the logging operators unwilling to spend money in burning on any large scale.

PERMITS FOR BURNING RAILWAY RIGHT-OF-WAY.

Altogether an area of 7,204 acres was burned, which, at 12 acres to the mile, means approximately 600 miles of right-of-way. Though some of this was cleaning up old right-of-way, the great bulk of it was done on new construction-work. The construction of the Pacific Great Eastern is responsible for most permits in Lillooet and Fort George Districts, the Canadian Northern Pacific in Tete Jaune District, and the Kootenay Central Railway in Cranbrook District. It should be noted that some of the logging-slash burned under permit was caused by the cutting of construction timber for railways.

PERMITS FOR CLEARING PUBLIC ROADS.

Public Road Superintendents are authorized by the Forest Branch to grant permits to their foremen to burn slash on public roads in order to give every possible facility to the work. The

amount burned is considerably greater than in 1913, and was carried on over a larger part of the Province.

PERMITS IN THE RAILWAY BELT.

Since the great bulk of land within the Railway Belt belongs to the Dominion Government, fire-protection there is under the jurisdiction of the Dominion Forestry Branch. For the purpose of issuing permits their officers are appointed Acting Forest Guards without pay by the Forest Board.

SLASH-DISPOSAL.

During the past fire season there was burned under permit a total of 73,000 acres of slash, and in addition 200 miles of public road slash.* The 73,000 acres was made up as follows: 50,000 acres burned by settlers clearing land for agricultural purposes; 5,700 acres by logging operators; and 7,200 acres by railways for clearing right-of-way and land from which construction timber had been cut.

During 1913 and 1914 brush resulting from the cuttings which covered a large portion of the 200,000 acres included within the boundaries of railway permits was filed by the contractors. These permits were granted to allow railroads under construction to cut timber for construction purposes free of charge from specified areas of Crown timber land. For the sake of fire-protection and close utilization brush-piling was required by the regulations, and these were enforced, so that railway-permit areas now show probably the best examples of brush-piling on a large scale which has been done in Canada; moreover, settlers and land-owners from whom the railway companies secured construction timber have in many cases followed the example of the Forest Branch, and required brush-piling on their lands.

The importance of slash-disposal from the standpoint of fire-protection is now universally recognized. If slash is not burned it is a constant hazard during dry weather. Slash from logging operations, if not disposed of each year, will accumulate during normal summers and then provide material for destructive fires which may defy control. Some of the worst and most costly fires of 1914 occurred in slashes which were the accumulated result of several years' logging in one tract of timber.

The systematic burning of heavy logging-slash is possibly the only measure necessary to secure good reproduction over a large part of British Columbia's forest area. If it is burned with proper precautions in spring or fall, when weather conditions are safe, the brush and litter covering the soil are cleared off, but seed-trees still standing and seed buried in the soil are not destroyed, and the soil is put in just the right state to act as a good seed-bed for the most desirable species, such as Douglas fir and cedar. Moreover, sufficient sunlight reaches the ground to ensure the germination of the seed and the healthy growth of the seedlings. If, however, the same slash burns in summer, when the weather is hot and the forest floor dried out, the fire kills the seed-trees and consumes not only the slash and litter on top of the soil, but also much of the soil itself and the seed buried in it, and thus delays regeneration of the forest for a long period.

* See under "Burning Permits."

VIOLATIONS OF THE FIRE-PROTECTIVE PROVISIONS OF THE "FOREST ACT."

PROSECUTIONS FOR VIOLATIONS OF FIRE-PROTECTION PROVISIONS OF "FOREST ACT," 1914.

Districts.	Total Informations laid.	Character of Offences.			Results of Cases.				
		Burning without Permit.	Incendiary.	Leaving Camp-fire burning.	Served Sentence in Gaol.	Fines paid.		Suspended Sentence.	Cases dismissed.
						No.	Amount.		
Cranbrook	3	3			2				1
Fort George									
Hazelton	1			1					1
Island	5	5				3	$ 150		2
Kamloops	3	3				2	150		1
Lillooet									
Nelson	20	17	3		4	9	550	5	2
Prince Rupert									
Tete Jaune									
Vancouver									
Vernon	5	3	2			5	250		
Totals	37	31	5	1	6	19	$1,100	5	7

During the fire season of 1914, 11,523 burning permits were issued. Eighty fires were set without permit in violation of the Statutes. Thirty-one informations were laid. Of the 1,846 fires reported for the season, forty-eight were reported to be of incendiary origin. Evidence sufficient to lay information was obtained for five of these incendiary fires. For 471 fires caused by campers and travellers only one information was laid. Altogether convictions were obtained in thirty-one cases; while seven were dismissed on the grounds of insufficient evidence.

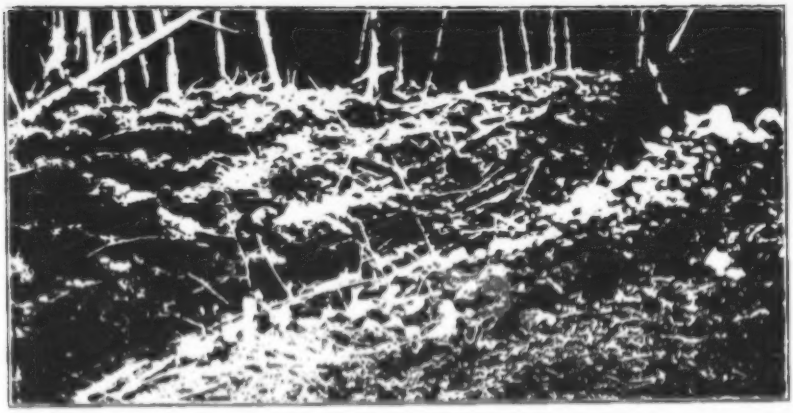
DOMINION RAILWAYS.

During the season of 1914 the arrangement made in 1912 by which the administrative officers of the Forest Branch acted for the railways under Dominion charter outside the Dominion Belt under the direction of Chief Fire Inspector Leavitt, of the Board of Railway Commissioners, continued in force. This arrangement is very advantageous to the Forest Branch, since it brings the field officers into personal contact with the officers and employees of the railway companies and ensures co-operation.

Under the arrangement described the Forest Branch supervised the protection-work on a total of 2,466 miles of railway, 200 of which, on the Kettle Valley and Kootenay Central Railways, was under construction. On the former road half of the expense of supervision was reimbursed to the Government. This plan is much more successful than the employment of patrolmen by a railway company, since the chief hazard in construction-work is the carelessness of railway employees.

The number and distribution of the patrolmen to be employed by the railways are fixed by Chief Fire Inspector Leavitt after consultation with the officers of the Forest Branch, and are based on the degree of danger, amount of traffic, and means of travel. Thirty-one patrolmen on power-speeders, nine on hand-speeders, and nineteen on foot were employed for a period of from two to five months exclusively on patrol and fire-protection work. On lines where the danger was slight or the traffic light the patrol was performed by sectionmen.

This system was very successful, and there is no question that had such a patrol not been in force during the past summer the numerous fires starting along railways would have burned



Slash resulting from road-construction.

Public Works crew burning slash caused by construction of road, thus reducing fire hazard and greatly improving appearance of road.

Fire in yellow-pine forest; kills all young growth and damages merchantable timber to extent of ten to twenty per cent.

over hundreds of thousands of acres. Attention is called to the large number of fires (more than 300) caused by sparks from locomotives; over a hundred of these being due to a new untested kind of coal, the use of which was immediately abandoned on discovery of its sparking qualities. The great risk from this cause is undeniable, and is the chief reason why forests along railways have been so badly burned. The figures also indicate, however (what the railway officials have long claimed), that trespassers frequently cause railway fires. Thirty-nine fires are known to have been started in this way, to which can be added a portion of the fires set from unknown causes.

A total of 31,679 acres of land were burned over by fires starting along the railways, causing a loss in property and timber of $129,869. The greater portion of this loss resulted from the destruction of buildings. Considering the financial depression, all the companies did remarkably good work in keeping their rights-of-way cleared of brush and debris. During the time in July, August, and September, when so many fires were being fought, particularly in the Cranbrook, Nelson, and Vernon Districts, all the companies gave most valuable assistance to the forest officers, and their co-operation is greatly appreciated by the Forest Branch.

PROVINCIAL RAILWAYS.

FIRE-PROTECTION STATISTICS OF PROVINCIAL RAILWAYS.

Name of Railway.	Total Mileage inspected.	No. of Patrolmen employed.					No. of Fires starting within 300 feet of Track, by Causes.					Total Acreage burned over by Railway Fires.	Total Damage to Timber and Property from Railway Fires.	Acreage of Right-of-way, Main Line and Sidings, to be kept clear of Brush.	No. of Coal-burning Locomotives.	No. of Oil-burning Locomotives.
		Power-speeder Patrolmen.	Handspeeder Patrolmen.	Foot Patrolmen.	Section-men following Trains.	Total.	Locomotives.	Unknown.	Campers and Travellers.	Track Maintenance, clearing Right-of-way.	Total.					
Pacific Great Eastern	445	....	....	29	1	30	....	7	66	57	130	19,862	$9,317	5,460	....	....
Canadian Northern Pacific	201	3	....	12	.....	15	11	....	6	9	26	210	470	4,662	.....	.....
Totals	846	3		41	1	45	11	7	72	66	156	20,072	$9,787	10,122	.....	.....

The past season saw the completion of the clearing of right-of-way and grading of the Canadian Northern Pacific and the Pacific Great Eastern Railways, both of which roads are under Provincial charter. To supervise fire-fighting and the destruction of debris forty-five patrolmen were employed for periods ranging from five months to a few weeks. The cost of such patrol is refunded to the Government by the railway companies.

The figures showing the causes of the fires are significant, in that they prove that the majority of the fires starting are due to the carelessness of labourers and camp followers rather than to actual construction-work. The area burned over consisted almost wholly of cut-over and burned-over lands, and practically no merchantable timber was destroyed. Most of the loss caused by the fires resulted from the destruction of railway-ties and camp and construction equipment.

Next year the Canadian Northern Pacific will be under operation and will then come within the jurisdiction of the Board of Railway Commissioners.

It may be said that as a result of the supervision of the right-of-way clearing and construction-work by the Government, and the co-operation of the railway officials and contractors, the right-of-way of both these roads is free from debris of any sort, and that there is no previous record of the construction of railways through forested regions where the timber has suffered such insignificant damage.

The Forest Branch desires to acknowledge the excellent manner in which the contractors, officers, and employees of the Canadian Northern Pacific and Pacific Great Eastern gave their assistance in fighting fire.

BURNING PERMITS.

BURNING PERMITS ISSUED BY OFFICERS OF THE FOREST BRANCH DURING 1914.

Forest District.	CLEARING AGRICULTURAL LAND.				CLEARING LOGGING-SLASH.				CLEARING RAILWAY RIGHT-OF-WAY.				CLEARING PUBLIC ROADS.				GRAND TOTALS.					
	Permits issued.	Area burned over.	Fires escaped Control.	Fires set without Permit.	Permits issued.	Area burned.	Fires escaped Control.	Fires set without Permit.	Permits issued.	Area burned.	Fires escaped Control.	Fires set without Permit.	Permits issued.	Miles burned.	Fires escaped Control.	Fires set without Permit.	Permits issued.		Acres burned (Public Roads not included).		Fires escaped Control.	Fires set without Permit.
	No.	Acres.	No.	No.	No.	Acres.	No.	No.	No.	Acres.	No.	No.	No.	Miles.	No.	No.	No.	Per Cent.	No.	Per Cent.	No.	No.
Cranbrook	478	1,650	5	1	101	180			9	70.6			14	17			602	6.0	2,577	4.0	5	1
Fort George	1,313	5,138	16	9	30	126			330	2,702	35	16			1	1	1,673	14.5	7,982	15.0	52	26
Hazelton	750	3,950	20	1					2	8			2	5			754	6.5	8,958	17.0	20	1
Island	2,544	6,525	10	12	43	1,730	1		4	8	2		2	6	1		2,954	22.5	8,283	15.6	14	12
Kamloops	329	1,329	4	6	18	112	1		41	126	5	1					388	3.4	1,589	3.0	10	7
Lillooet	204	675	2	2	3	201			181	1,766	2	5					388	3.4	2,746	5.2	4	7
Nelson	2,801	4,160	11	21	12	559			74				82	95	2		3,060	26.5	4,719	8.9	13	21
Prince Rupert	317	320	3														317	2.8	320	0.6	3	
Tete Jaune	47	202	1						29	1,139							76	0.7	1,401	2.6	1	
Vancouver	787	7,000	2	2	93	7,708			14	308			6	21			900	7.8	10,708	20.2	2	2
Vernon	647	3,505	4	3					32	225			3	147			682	5.9	3,730	7.0	4	3
Totals	10,307	40,004	78	57	301	5,727	2		716	7,316	44	22	109	289	4	1	11,523	100.0	52,935	100.0	128	80
Per cent. grand totals	89.4	75.6	60.9	71.2	2.4	10.8	1.6		6.2	13.8	34.4	27.5	1.0		3.1	1.3	100		100		100	100

For burning old ties.

NOTE.—The 289 miles of "public road slash" burned under permit is in addition to the 52,935 acres total.

Fire-protection Statistics of Dominion Railways.

Name of Railway.	Total Mileage inspected.	No. of Patrolmen employed.					No. of Fires starting within 300 Feet of Track, by Causes.							Total Average burned over by Railway Fires.	Total Damage to Timber and Property from Railway Fires.	Acres of Right-of-way, Main Line and Sidings to be kept clear of Brush.	No. of Coal-burning Locomotives.	No. of Oil-burning Locomotives.
		Power-speeder Patrolmen.	Hand-speeder Patrolmen.	Foot Patrolmen.	Sectionmen following Trains.	Total.	Locomotives.	Unknown.	Campers and Travellers.	Settlers burning Brush within 300 Feet of Rail.	Steam-shovels.	Track Maintenance, Clearing Right-of-way.	Total.					
Canadian Pacific (including E. & N.	1,053.7	12	8	3	89	112	92	33	15	12	....	....	242	9,779	$120,580	15,586	70	30
Great Northern	423.0	8	1	9	21	39	14	2	4	....	1	....	120	16,423	17,500	5,446	14	11
Grand Trunk Pacific	702.0	0	....	....	....	0	6	9	20	10	2	4	51	5,370	1,300	9,423	27	....
Kettle Valley	250.0	4	....	7	11	22	4	....	....	....	....	....	4	7	....	3,936	8	....
Morrissey-Fernie & Michel	5.0	....	....	....	1	1	3	1	....	....	....	....	4	1	500	60	4	....
Canada Western Power Co	5.3	1	....	....	....	1	10	....	....	....	....	....	10	100	....	60	2	....
White Pass & Yukon	32.3	....	....	....	5	5	....	1	....	....	....	....	1	10	....	320	8	....
Totals	2,466.3	31	9	19	127	186	129	16	39	12	3	4	432	31,670	$139,889	34,512	133	41

PERMANENT IMPROVEMENTS.

SUMMARY OF NEW IMPROVEMENT-WORK DONE, 1914.

Kind of Work.	Number.	Miles.	Cost.	Average Cost per Mile or Unit.
Horse-trails	28	238	$ 8,803 00	$ 37 00
Foot-trails	10	22	164 00	7 50
Telephone-lines	4	94	11,602 00	123 50
Cabins	9	...	1,665 00	185 00
Boat-houses and caches	9	...	604 00	67 00
Launches, boats, and canoes bought and built	27	...	5,344 00	197 00
Total	...	...	$28,272 00	...

MAINTENANCE-WORK DONE ON IMPROVEMENTS, 1914.

Kind of Work.	Number.	Miles.	Cost.	Average Cost per Mile or Unit.
Horse-trails	26	239	$ 716 00	$2 75
Telephone-lines	9	224	1,212 00	5 40
Total	...	...	$1,928 00	...

At the beginning of the season a comparatively small amount of money was allotted for improvement-work. In the end, on account of the dangerous and expensive season, the expenditure on such work was only about a quarter that of 1913, though the total amount of work done was considerably more than a quarter that of 1913; owing to improved organization, a greater amount of work was done by the Guards during periods when weather conditions made patrol temporarily unnecessary than has been the case heretofore. At the beginning of the season each Guard was given a definite programme of improvement-work on which to engage himself during non-hazardous periods and the work was supervised by the Rangers and District Foresters.

LIST OF PERMANENT IMPROVEMENT PROJECTS WORKED ON, 1914.

Cranbrook Forest District.

New work—

Upper Kootenay Telephone-line	19.75	miles.
Elk-Fording River Horse-trail	12	"
Letcher Horse-trail	2	"

Maintenance-work—

Baker Mountain Telephone-line	7	miles.
Elk River Telephone-line	45	"
Phillips Creek Horse-trail	10.5	"

Fort George Forest District.

New work—

Barkerville-Stony Lake Horse-trail	5	miles.
Willow River Horse-trail	5.25	"
Sucker Creek-Horsefly Lake Foot-trail	1	"
Bobtail Lake-Mud River Horse-trail	8	"
Blackwater-Nazko Horse-trail	12	"
Willow River Look-out Foot-trail	0.75	"
Summit Lake-Teapot Mountain Look-out Foot-trail	0.66	"
Deadmans Lake Look-out Foot-trail	1.5	"
Finlay Junction Look-out Foot-trail	0.63	"

New work—
Finlay Junction Ranger Station Cabin.
North Fork Tool Cache.
Cariboo Lake Boat.
Spectacle Lake Boat Portage Trail ..... 4 miles.
Aleza Lake Canoe Channel ..... 1.5 "
Mount Pope Look-out Foot-trail ..... 1.5 "
Maintenance-work—
Barkerville-Stony Lake Horse-trail ..... 5 miles.
Willow River Horse-trail ..... 2 "
Blackwater-Fraser River Horse-trail ..... 15 "
St. James-McLeod Trail Bridge ..... 30 feet.
Chief Lake-Salmon River Horse-trail ..... 32.5 miles.
Cluskus Patrol Horse-trail ..... 35 "
Tsasha-Cluskus Horse-trail ..... 15 "
Upper Mud River Horse-trail ..... 25 "
Pollys Lake Horse-trail ..... 15 "
Antoine Lake Horse-trail ..... 5 "
Quesnel Forks-Keithley Horse-trail ..... 18 "
Nazko Road Horse-trail ..... 5 "

Hazelton Forest District.

New work—
Burns Lake Cabin.
Copper River Cabin ..... 18 x 14 x 6 wall.
Takla Lake Cabin ..... 20 x 16 x 8 "
Takla Lake Boat-house ..... 22 x 10 x 10 "
McPherson Ranger Station Horse-trail ..... 1.25 miles.
Lakelse Cabin ..... 20 x 14 x 7 wall.
Lakelse Boat-house ..... 20 x 10 x 6 "
Kitimat-Onion Lake Horse-trail ..... 7 miles.
Babine Lake Boat-house ..... 23 x 11 x 6 wall.
Francois Lake Boat-house ..... 23 x 11 x 6 "
Ootsa Lake Boat-house ..... 24 x 12 x 6 "
Mud Lake Stable ..... 14 x 12 x 6 "
Maintenance-work—
Breckenridge-Coldwater Horse-trail ..... 9 miles.
Zimgotitz River-Mud Lake Horse-trail ..... 10 "
Terrace-Lakelse Telephone-line ..... 17 "

Island Forest District.

New work—
Gordon River-Cowichan Lake Horse-trail ..... 5.25 miles.
Gold River Horse-trail ..... 8.28 "
Maintenance-work—
Harris Creek Horse-trail ..... 10 miles.

Kamloops Forest District.

New work—
Big Bend Telephone-line ..... 60 miles.
Goldstream Ranger Station Cabin ..... 14 x 16
Spruce Flat Ranger Station Cabin ..... 14 x 16
Launch for Adams Lake ..... 32 x 7
Clearwater-Myrtle Lake Horse-trail ..... 9 miles.
Hardscrabble Horse-trail ..... 1.5 "
Little Clearwater-Pyramid Horse-trail ..... 4 "
Maintenance-work—
Big Bend Telephone-line ..... 32 miles.

Lillooet Forest District.

New work—

North Bridge River, LeMare Lake, and Johnson Lake Horse-trail	6	miles.
100-Mile House to Alkali Lake Road Horse-trail	30	"
Cedar Creek Horse-trail	3.5	"
Parkes Ranch to Pavilion Mountain Horse-trail	5	"
Leon Lake to Jamieson Ranch Horse-trail	1	"

Maintenance-work—

Nemiah Valley and Hanceville Trail.		
Bridge River Horse-trail	5	miles.
Miscellaneous old Horse-trails	30	"

Nelson Forest District.

New work—

Installation of Big Sheep Creek Telephone.		
Mosquito Creek-Whatshan Lake Horse-trail	5	miles.
Wilson Creek Horse-trail	2	"
Boulder Creek Horse-trail	4	"
James Lake-Fish Lake Horse-trail	2	"
Mosquito Creek Telephone-line	2.5	"
West Fork of North Fork of Kettle River Horse-trail	38	"
Lower Arrow Lake Boat-house	16 x 32	
Installation Donaldson Mountain Look-out Telephone.		
Duncan River Telephone-line Foot-trail	6	miles.
Big Sheep Creek Horse-trail	13	"
Twelve-mile Creek Foot-trail	2	"
West Fork of Little Slocan River Foot-trail	4.5	"
Installation Duncan River Telephone.		
East River Cable Crossing.		
Fifteen-mile Horse-trail	3	"
Donaldson Mountain Horse-trail	2	"

Maintenance-work—

Kettle River Telephone-line	18	miles.
Boulder Creek Horse-trail	1	"
Erie Second Relief Telephone-line	13	"
Duncan River Horse-trail	12	"
Donaldson Mountain Horse-trail	2	"
Wilson Creek Horse-trail	3	"

Prince Rupert District.

New work—

Meziadin Lake Cabin	14 x 16	

Vancouver Forest District.

New work—

Heriot Bay Telephone-line (including 14,300 feet of submarine telephone-cable laid as follows: Okisollow Channel, 5,000 feet; Nodales Channel, 6,300 feet; and Cardero Channel, 3,000 feet..	11.5	miles.
Campbell-Salmon River Horse-trail	7	"
Thunder Bay-Lund Horse-trail	25	"

Maintenance-work—

Heriot Bay Telephone-line	63.5	miles.
Campbell-Salmon River Horse-trail	7	"

Vernon Forest District.

New work—

Ellis-Penticton Creek Horse-trail	5	miles.
Whitemans Lake to Bear Creek Horse-trail	5	"
Mable Lake Boat-house	16 x 20	
B.X. Look-out Cabin	12 x 16	
Little White Mountain Look-out Cabin	12 x 16	

Maintenance-work—

B.X. Mountain Telephone-line	16	miles.
Little White Mountain Telephone-line	12	"
Little White Mountain Telephone-line Horse-trail	6	"
Shorts Creek Horse-trail	5	"

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